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PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

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SAMS PHOTOFACT* SET No. 378

*TRADEMARK

TRADE NAME	MODEL	SET AND FOLDER No.
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GU-GUU

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The PHOTOFACT Servicer

Set 378 - Vol. 38 ★ *Published for all users of Howard W. Sams' Photofact Folders* **★ Nov. 15, 1957**

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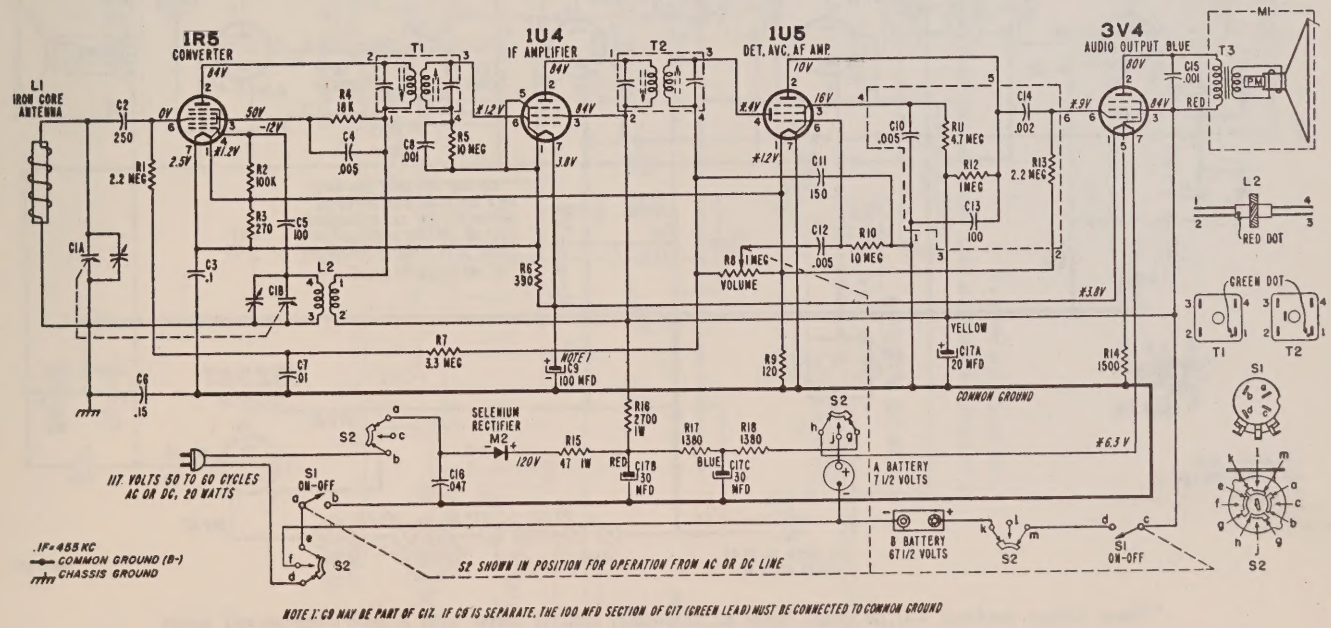
DENVER, COLORADO

The service information in this Servicer provides data on models which we have been unable to present in PHOTOFACT Folders. The receivers are not in current production; a requirement for PHOTOFACT coverage, and we are therefore presenting schematics and supplementary data that will be of assistance when servicing these models.

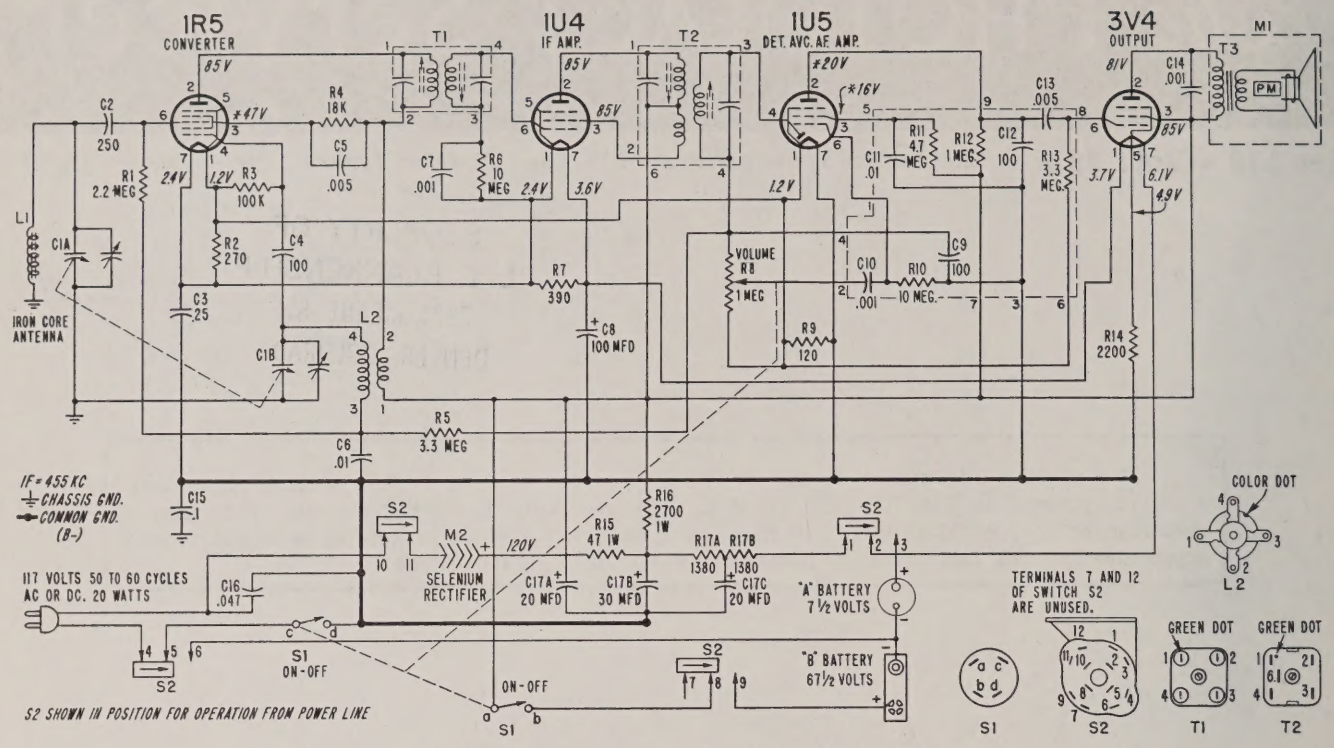
Admiral Ch. 4B2 (Models 4B21, 22, 24, 28, 29)



NOTE 1: C9 MAY BE PART OF C17. IF C9 IS SEPARATE, THE 100 MFD SECTION OF C17 (GREEN LEAD) MUST BE CONNECTED TO COMMON GROUND

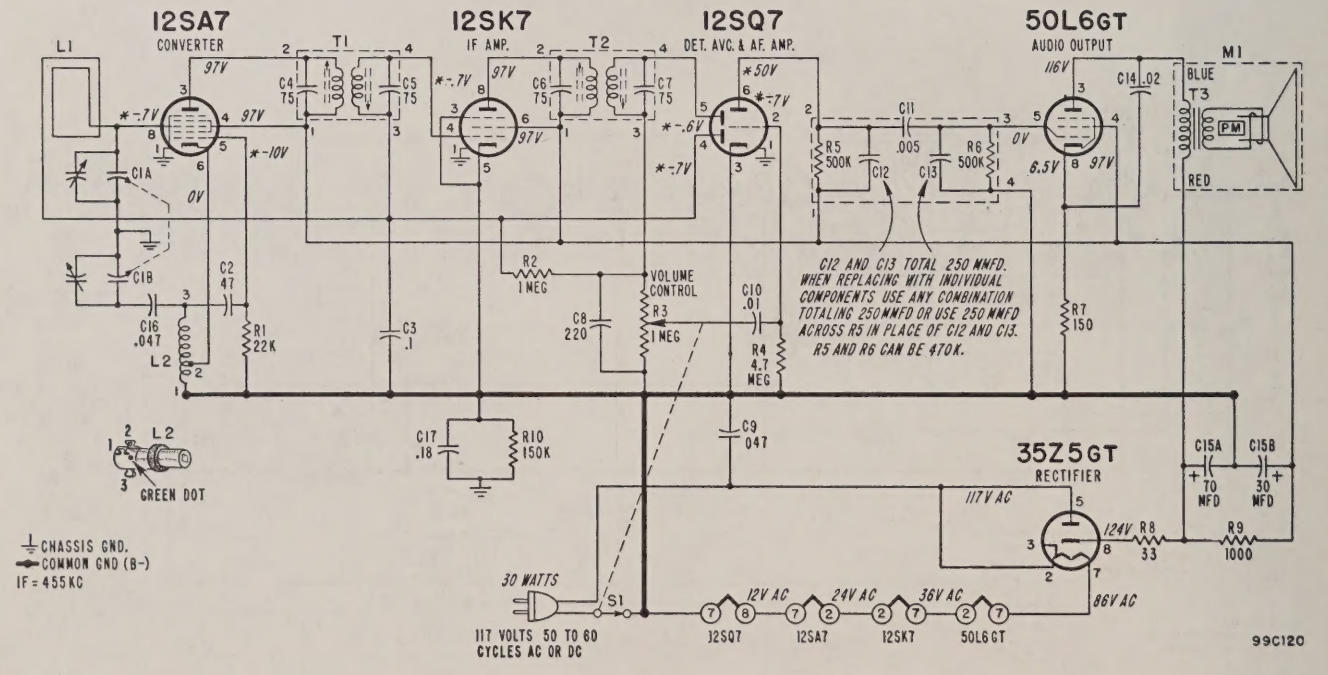
Schematic Diagram Courtesy of the Admiral Corp.

Admiral Ch. 4V1 (Models 4V14, 4V18, 4V19)



*These voltage readings will be either lower or practically zero if taken with a 1000 ohm-per-volt meter.

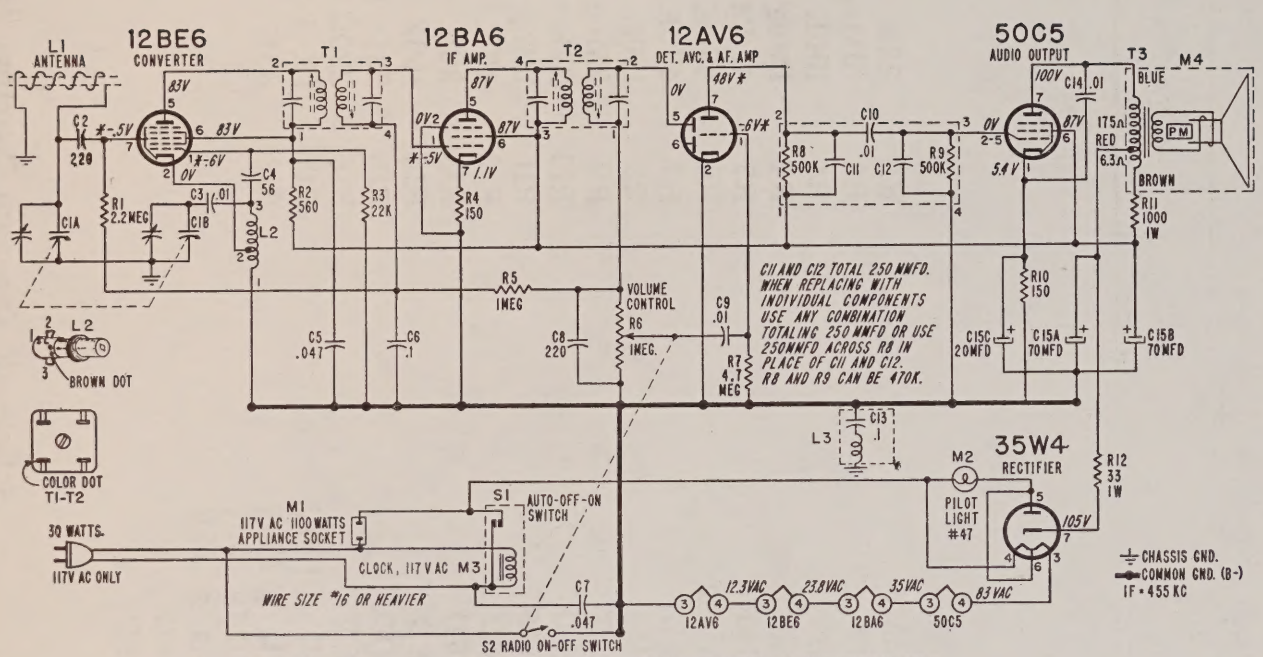
Schematic Diagram Courtesy of the Admiral Corp.



*These voltage readings will be either lower or practically zero if taken with a 1000 ohm-per-volt meter.

Admiral Ch. 5Z2 (Models 5Z22, 5Z23)

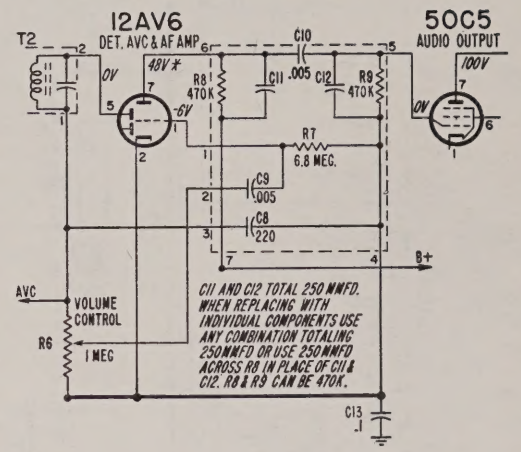
Admiral Ch. 5F3, A, B (Models 5F31, A, B, 5F32, A, B, 5F33, A, B 5F34B, 5F38, A, B)



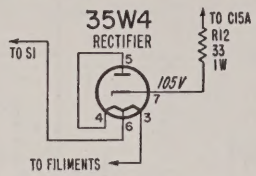
* THESE VOLTAGE READINGS WILL BE EITHER LOWER OR PRACTICALLY ZERO IF TAKEN WITH A 1000-OHMS-PER-VOLT METER.

+ USED ON 5F3A, 5F3B CHASSIS.

+ALTERNATE AUDIO COUPLING SYSTEM

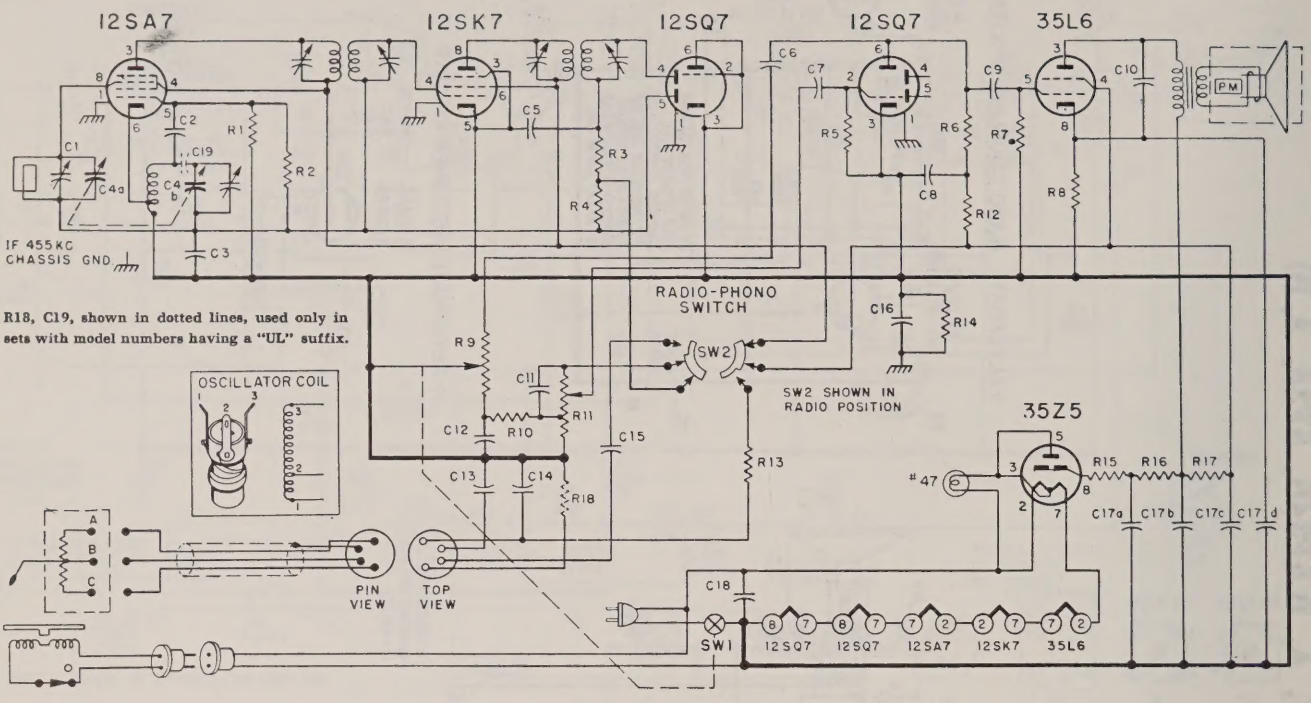

12AV6 DET. AVC & AF AMP
50C5 AUDIO OUTPUT
T2
C10
R8 470K
C11 .005
C12
R9 470K
R7 6.8 MEG.
C9 .005
C8 220
AVC
VOLUME CONTROL
R6 1 MEG
C11 AND C12 TOTAL 250 MMFD. WHEN REPLACING WITH INDIVIDUAL COMPONENTS USE ANY COMBINATION TOTALING 250MMFD OR USE 250 MMFD ACROSS R8 IN PLACE OF C11 & C12. R8 & R9 CAN BE 470K.
C13 .1
B+

+ ALTERNATE RECTIFIER CIRCUIT



Schematic Diagram Courtesy of the Admiral Corp.

Admiral Ch. 6F1 (Models 6F10, 6F11, 6F12)



C1	3-30MMF	R1	22K
C2	50MMF	R2	10Meg
C3	.1MMF	R3	100K
C4	Tuning Gang	R4	1Meg
C5	250MMF	R5	4.7Meg
C6	.002MFD	R6	470K
C7	.01MFD	R7	470K
C8	.1MFD	R8	150Ω
C9	.01MFD	R9	2Meg
C10	.03MFD	R10	27K
C11	500MMF	R11	1Meg
C12	.01MFD	R12	47K
C13	.05MFD	R13	22K
C14	.18MFD	R14	150K
C15	.001MFD	R15	33Ω 1 W
C16	.18MFD	R16	220Ω 1 W
C17A	30MFD @150V	R17	1K 1 W
B	30MFD @ 150V	R18	33K
C	20MFD @ 150V		
D	20MFD @ 25V		
C18	.05MFD		
C19	.02MFD		

Schematic Diagram Courtesy of the Admiral Corp.

PHOTOFACT* Folder
*TRADE MARK

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DENVER, COLORADO

SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 2 IN SET 313

Airline Models WG-4011A, B, WG-4012A, B, WG-4111A, B, C, WG-4112A, B, C, WG-5011A, B, WG-5014A, B, WG-5016A, WG-5018A, WG-5111A, B, C, WG-5114A, B, C, WG-5116A and WG-5118A (Code 21A59CT) were covered in Photofact Folder 2 - Set 313 and Production Change Bulletin 173 in Photofact Folder 1 - Set 340.

Models WG-4021A, B, C, D, E, WG-4022A, B, C, D, E, WG-4121A, B, C, D, WG-4122A, B, C, D, WG-5031A, B, C, D, E, WG-5034A, B, C, D, E, WG-5036B, WG-5037B, WG-5131A, B, C, D, WG-5134A, B, C, D, WG-5136B and WG-5137B are added with the publication of this bulletin.

The following changes apply to all models added.

COMPONENT CHANGES

C36 is increased from 560MMF to 680MMF.

A 1.5Meg, ½ watt resistor is added from R2 (brightness control) to the switch on volume control.

T4 (deflection yoke) is a plug-in type, part #9A2387. A partial schematic showing the deflection yoke, plug and socket is given in Fig. 1.

R1A, B, C (volume, contrast, switch) is changed to part #78X25. Replacement data for this part number is identical to data recommended for the original part number.

R2 (brightness control) is changed to part #40X416. Replacement data for this part number is identical to data recommended for the original part number.

M7 (local-suburban-fringe switch) is changed to a range control, part #40X417. A partial schematic showing the new circuit is given in Fig. 2.

R3 (vertical hold control) is changed to part #40X415. Replacement data for this part number is identical to data recommended for the original part number.

R4 (horizontal hold control) is changed to part #40X414. Replacement data for this part number is identical to data recommended for the original part number.

T5 (audio output transformer) is changed to part #51X180. Replacement data for this part number is given in the chart below.

AIRLINE MODELS WG-4021A, B, C, D, E, WG-4022A, B, C, D, E, WG-4121A, B, C, D, WG-4122A, B, C, D, WG-5031A, B, C, D, E, WG-5034A, B, C, D, E, WG-5036B, WG-5037B, WG-5131A, B, C, D, WG-5134A, B, C, D, WG-5136B, WG-5137B

PRODUCTION CHANGES
BULLETIN 193

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	AIRLINE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T5	6.2K	6-8Ω	51X180	Z1000 ① ②	A-2900 ① ②	A-3337 ①	24S60 ① ②	S-51X ① ②	① Drill one new mounting hole.

(Con't on reverse side)

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FOLDER 1

	T2 (horizontal output transformer) is changed to part #53X359. A pilot light transformer has been added. A partial schematic showing the new circuit is given in Fig. 3. Replacement data for this transformer is given in the chart below.

PILOT LIGHT TRANSFORMER

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	AIRLINE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
	117VAC @ .017A	6.3V @ .200A			54X17	F5511①②	P-2944 ①②	P-6134 ①②	21F08 ①②	F-13X①

① Drill one new mounting hole.
② Tape center tap on secondary.

WG-4021A WG-4022A WG-5031A WG-5034A (VHF only)	VHF TUNER CHANGED Models WG-4021A, WG-4022A, WG-5031A and WG-5034A use VHF tuner part #25A1143. This tuner is electrically identical to VHF tuner part #25A1133 covered in Photofact Folder 2 - Set 313.
WG-4121A WG-4122A WG-5131A WG-5134A (VHF/UHF)	VHF/UHF TUNER CHANGED Models WG-4121A, WG-4122A, WG-5131A and WG-5134A use VHF/UHF tuner part #25A1145. This tuner is electrically identical to VHF/UHF Tuner part #25A1134 or #25A1138 covered in Photofact Folder 2 — Set 313.
WG-4021B WG-4022B WG-5031B WG-5034B (VHF only)	MODEL COMPARISON Issue "B" models are identical to issue "A" models, except for the following changes. NEW VHF TUNER VHF tuner part #25A1148 is used in issue "B" models. A schematic of this tuner is given in Fig. 4. COMPONENT CHANGE R84 is decreased from 2500Ω to 1700Ω.
WG-4121B, C WG-4122B, C WG-5131B, C WG-5134B, C (VHF/UHF)	MODEL COMPARISON Issue "B" models are identical to issue "A" models and issue "C" models are identical to issue "B" models, except for the following changes. PILOT LIGHT TRANSFORMER ADDED A pilot light transformer has been added. A partial schematic and replacement data are given in this bulletin. COMPONENT CHANGE R84 is decreased from 2500Ω to 2000Ω.
WG-4021D WG-4022D WG-5031D WG-5034D (VHF only)	MODEL COMPARISON Issue "D" models are identical to issue "C" models, except for the following changes. NEW VIDEO IF TUBES V3 (1st. Video IF) and V4 (2nd. Video IF) are changed from 3CB6 to 3BZ6. TO IMPROVE AGC ACTION R25 is decreased from 5000Ω, 4 watt to 150Ω, ½ watt and connected to the 140V source. R84 is decreased from 2500Ω to 1300Ω. R37 is increased from 47Ω to 68Ω.
WG-4121D WG-4122D WG-5131D WG-5134D (VHF/UHF) WG-4021E WG-4022E WG-5031E WG-5034E (VHF only)	MODEL COMPARISON Issue "D" models are identical to issue "C" models and issue "E" models are identical to issue "D" models, except for the following changes. TO COMPLY WITH FCC REGULATIONS AS TO RADIATION V14 (damper) and V13 (horizontal output) are relocated in the filament string. V11 becomes the first tube in the filament string with V14 and V13 reconnected from pin 1 of V16 to ground. C81 is omitted. A .22MFD @ 400V capacitor is added across the AC interlock. A pilot light transformer is added, part #54X18. A partial schematic showing the new transformer is given in Fig. 3. V16 (picture tube) is changed from 21ATP4 to 21BTP4.

WG-5136B WG-5137B (VHF/UHF)	NEW VHF/UHF TUNER Models WG-5136B and WG-5137B use tuner part #25A1152. A schematic of this tuner is given in Fig. 5.
WG-5036B WG-5037B (VHF only) WG-5136B WG-5137B (VHF/UHF)	COMPONENT CHANGES R25 is decreased from 5000Ω, 4 watts to 150Ω, ½ watt and is connected to the 140V source. C36 is increased from 560MMF to 680MMF. C38 is decreased from 1000MMF to 680MMF. R37 is increased from 47Ω to 68Ω. A 1.5Meg, ½ watt resistor is added from R2 (brightness control) to the switch on volume control. T4 (deflection yoke) is a plug in type. A partial schematic showing the deflection yoke, plug and socket is given in Fig. 1. V16 (picture tube) is a 24DP4A. V3 (1st. Video IF) and V4 (2nd. Video IF) are changed from 3CB6 to 3BZ6. TO COMPLY WITH FCC REGULATIONS AS TO RADIATION V14 (damper) and V13 (horizontal output) are relocated in the filament string. V11 becomes the first tube in the filament string with V14 and V13 reconnected from pin 1 of V16 to ground. C81 is omitted. A .22MFD @ 400V capacitor is added across the AC interlock.
WG-5036B WG-5037B (VHF only)	NEW VHF TUNER Models WG-5036B and WG-5037B use tuner part #25A1156. A schematic of this tuner is given in Fig. 4.

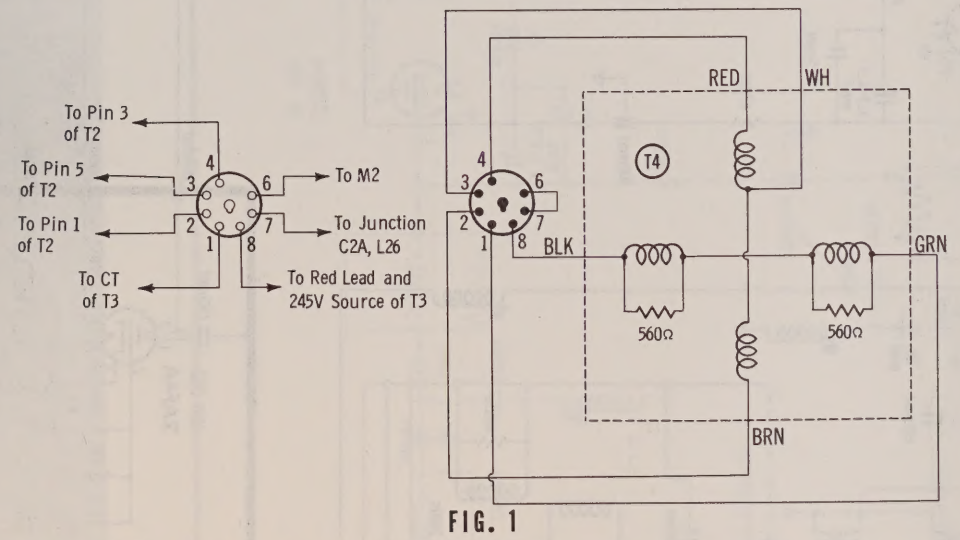


FIG. 1

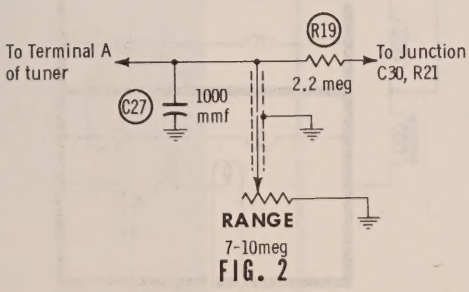


FIG. 2

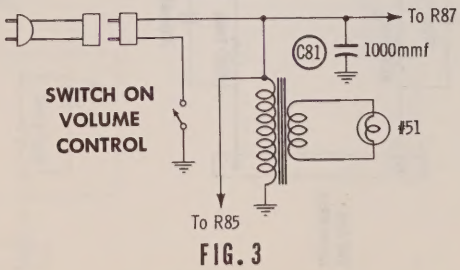
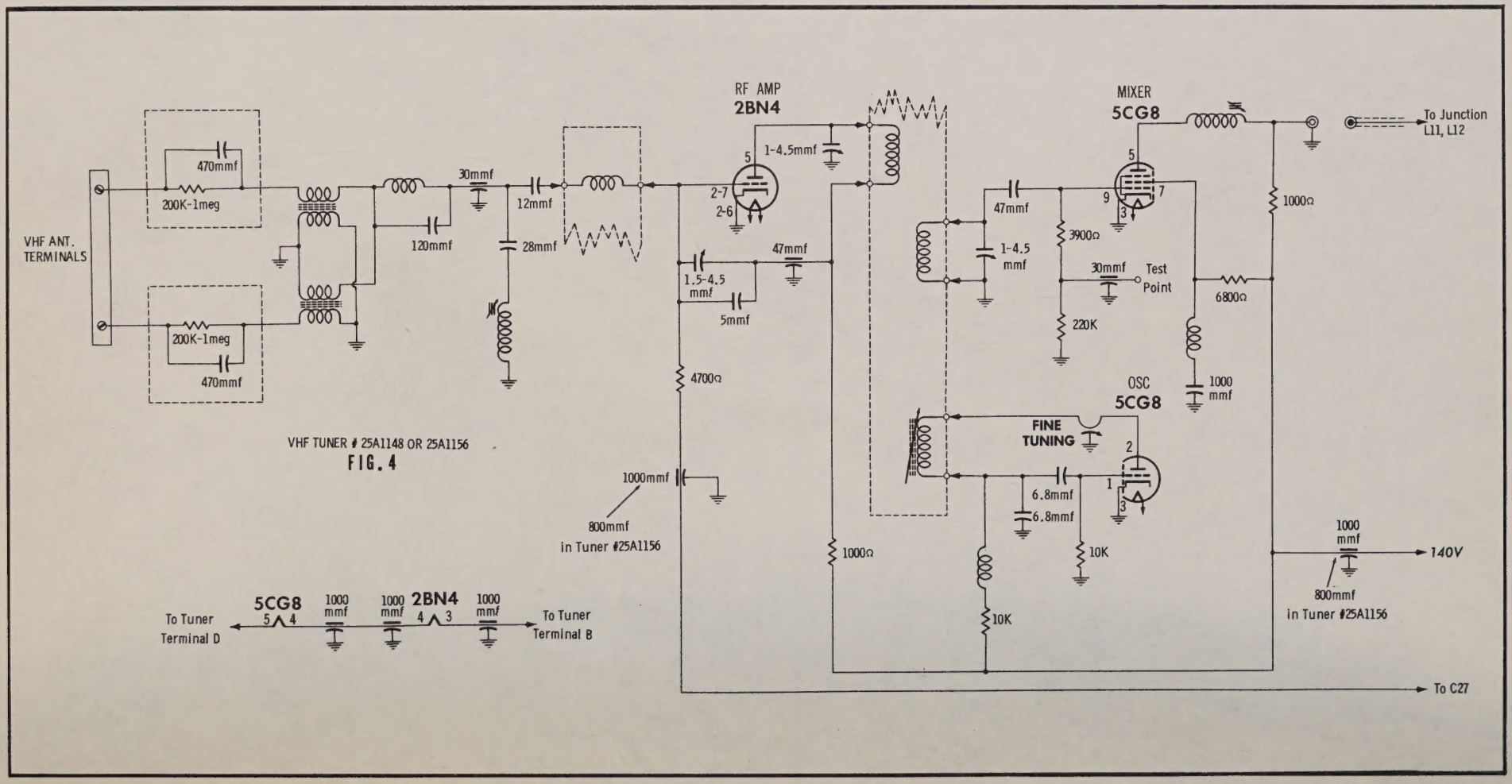


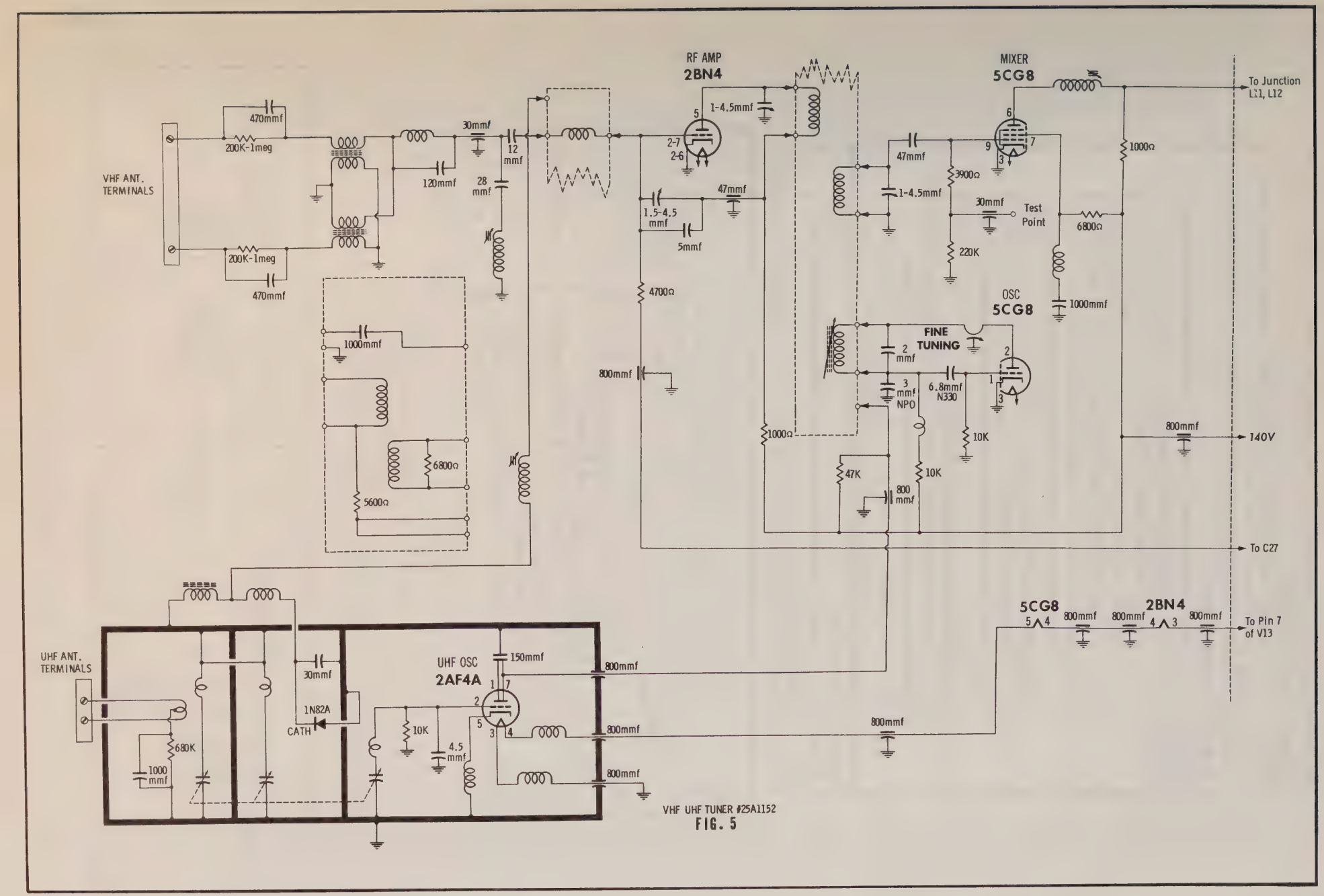
FIG. 3



VHF TUNER # 25A1148 OR 25A1156

FIG. 4

FOLDER 1



VHF UHF TUNER #25A1152

FIG. 5

FOLDER 1

PHOTOFACT* Folder

*TRADE MARK

RETMA MEMBER

AIRLINE MODELS
GTM-4031, GTM-4131A

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AIRLINE MODELS
GTM-4031, GTM-4131A

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FOLDER 2

PHOTOFACT* Folder
*TRADE MARK

AIRLINE MODELS GTM-4031, GTM-4131A

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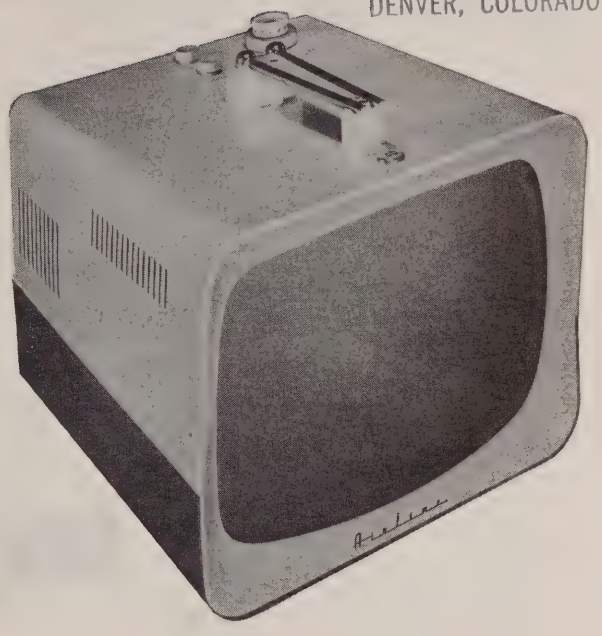
DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 4 push-on type knobs from the top.
2. Remove 7 metal screws and the rear cover.
3. Remove the picture tube socket, ion trap, yoke clamp, HV lead and 2 speaker leads.
4. Remove 2 speaker nuts and the speaker.
5. Remove 1 metal screw from the top chassis brace.
6. Remove 4 chassis bolts from the bottom.
7. Remove the chassis and yoke.



CAUTION NOTE

ONE SIDE OF AC LINE CONNECTED TO CHASSIS
Care should be exercised when connecting test equipment or physically contacting the chassis.

AIRLINE MODELS
GTM-4031, GTM-4131A

TRADE NAME	Airline Models GTM-4031A, GTM-4131A
SUPPLIER	Montgomery Ward & Co., 619 Chicago Avenue, Chicago, Illinois
TYPE SET	Television Receiver
TUBES	Sixteen
POWER SUPPLY	105-125 Volts AC, 60 Cycle RATING 120 Watts, 1 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

For touch-up adjustment of the VHF oscillator it is necessary to remove the chassis from the cabinet. (See disassembly instructions).

PICTURE TUBE SAFETY GLASS CLEANING

Remove 4 metal screws holding the front. Remove the front and safety glass.

FOCUS

Adjust the ion trap for the best focus consistent with maximum brightness.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

For adjustment of the horizontal oscillator, it is necessary to remove the rear cover and supply power to set. Set the horizontal hold at the center of its range and adjust the horizontal frequency slug (B2) until the picture synchronizes horizontally. (For location, see tube placement chart).

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate audio detector buzz, adjust the quieting control for MINIMUM buzz and maximum sound. (For location, see tube placement chart).

FUSE DEVICE

A 4.7Ω fusible resistor (R82) is used for LV power supply protection. (For location, see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube. Rotate the two rings around the neck of the tube until the picture is properly centered.

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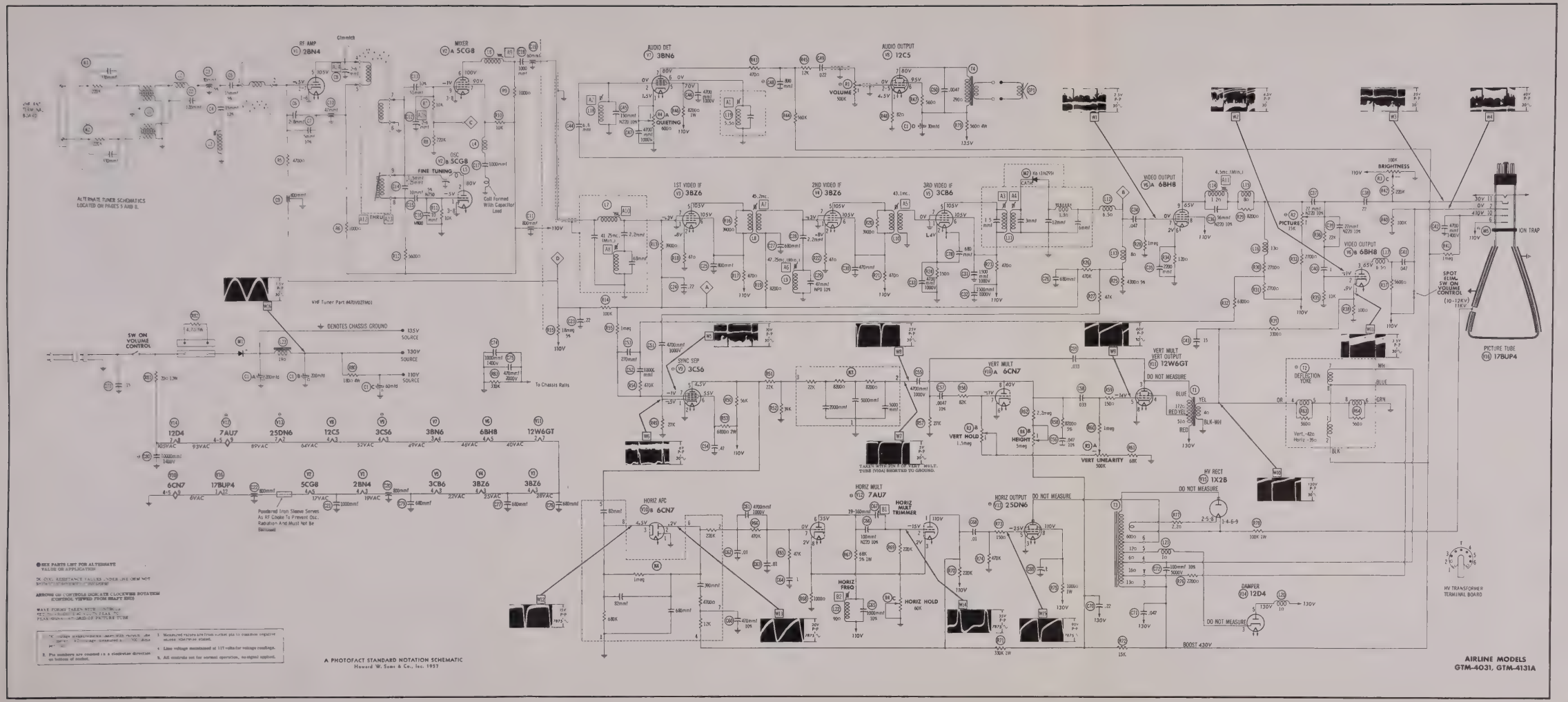
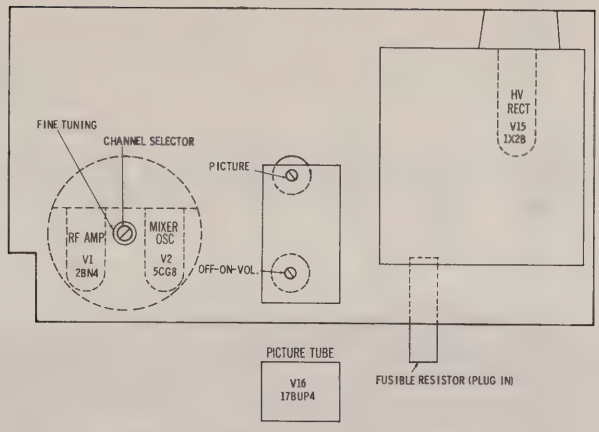
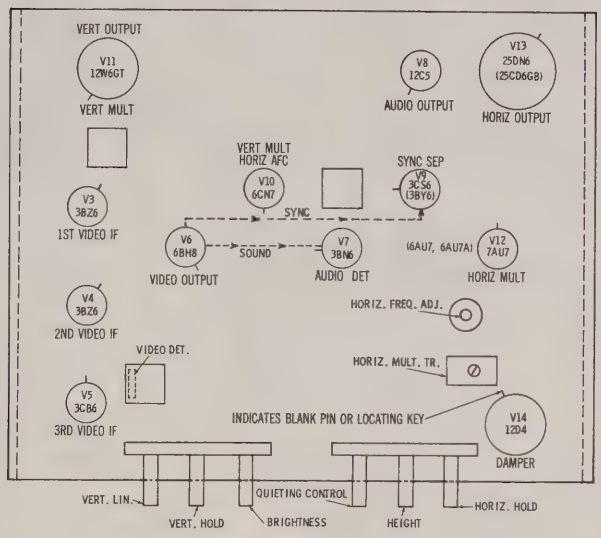

RF AMP V1 2BN4
MIXER V7 A 5CG8
OSC V2 B 5CG8
AUDIO DET V7 3BN6
AUDIO OUTPUT V8 12C5
VOLUME 500K
FINE TUNING
Coil Formed With Capacitor Load
ALTERNATE TUNER SCHEMATICS LOCATED ON PAGES 5 AND 8.
1ST VIDEO IF V5 3BZ6
2ND VIDEO IF V4 3BZ6
3RD VIDEO IF V5 3CB6
VIDEO OUTPUT V6 A 6BH8
VIDEO OUTPUT V6 B 6BH8
PICTURE 15K
BRIGHTNESS
ION TRAP
PICTURE TUBE V16 17BUP4
SPOT ELIM. SW ON VOLUME CONTROL
DENOTES CHASSIS GROUND
135V SOURCE
130V SOURCE
110V SOURCE
SW ON VOLUME CONTROL
To Chassis Rails
SYNC SEP V5 3CS6
VERT MULT V10 A 6CN7
VERT MULT VERT OUTPUT V11 12W6GT
DO NOT MEASURE
VERT HOLD 1.5meg
HEIGHT 5meg
VERT LINEARITY 500K
DEFLECTION YOKE
Vert.-42o Horiz.-35o
HV RECT V15 1X2B
HV TRANSFORMER TERMINAL BOARD
DAMPER V14 12D4
BOOST 430V
HORIZ AFC V10 B 6CN7
HORIZ MULT V12 7AU7
HORIZ MULT TRIMMER
HORIZ FREQ
HORIZ HOLD 60K
HORIZ OUTPUT V13 25DN6
12D4 7AU7 25DN6 12C5 3CS6 3BN6 6BH8 12W6GT
6CN7 17BUP4 5CG8 2BN4 3CB6 3BZ6 3BZ6
Powdered Iron Sleeve Serves As RF Choke To Prevent Osc. Radiation And Must Not Be Removed
SEE PARTS LIST FOR ALTERNATE VALUES OR APPLICATION
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)
1. Measured values are from socket pin to common negative unless otherwise noted.
2. Pin numbers are counted in a clockwise direction as bottom of socket.
3. All controls set for normal operation, no signal applied.
4. Line voltage maintained at 117 volts for voltage readings.
A PHOTOFACT STANDARD NOTATION SCHEMATIC
Howard W. Sams & Co., Inc. 1957
AIRLINE MODELS
GTM-4031, GTM-4131A

TUBE PLACEMENT CHART





TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

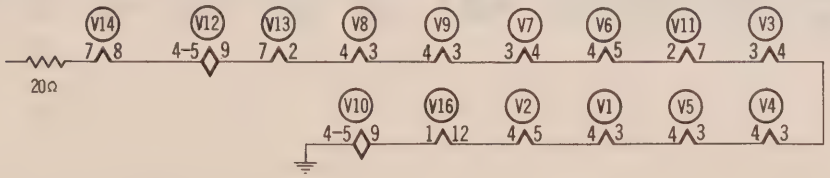
POWER SUPPLY FAILURE
No raster, no sound - **Fusible Resistor (R82), Rectifier (M1)**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster -**V3, V4, V5, Diode (M2), V6**
No pic, no sound, has snow - **V1, V2, V3**
No pic, has sound, has raster - **V6, V16**
Has pic, no sound - **V7, V8**

SYNC FAILURE
No vert. sync - **V9**
No horiz. sync - **V9, V10**
No vert. or horiz. sync - **V9**

SWEEP FAILURE
No raster, has sound - **V10, V12, V13, V14, V15, V16**
No vertical deflection - **V10, V11**
Poor vert. linearity or foldover - **V10, V11**
Poor horiz. linearity or foldover - **V12, V13, V14**
Narrow picture - **V12, V13, V14, M1**
Vert. off freq. - **V10, V11**
Horiz. off freq. - **V12**

This receiver employs tubes used in a series filament network, an open filament in any tube in the series will cause the set to be inoperative. (See circuit below).



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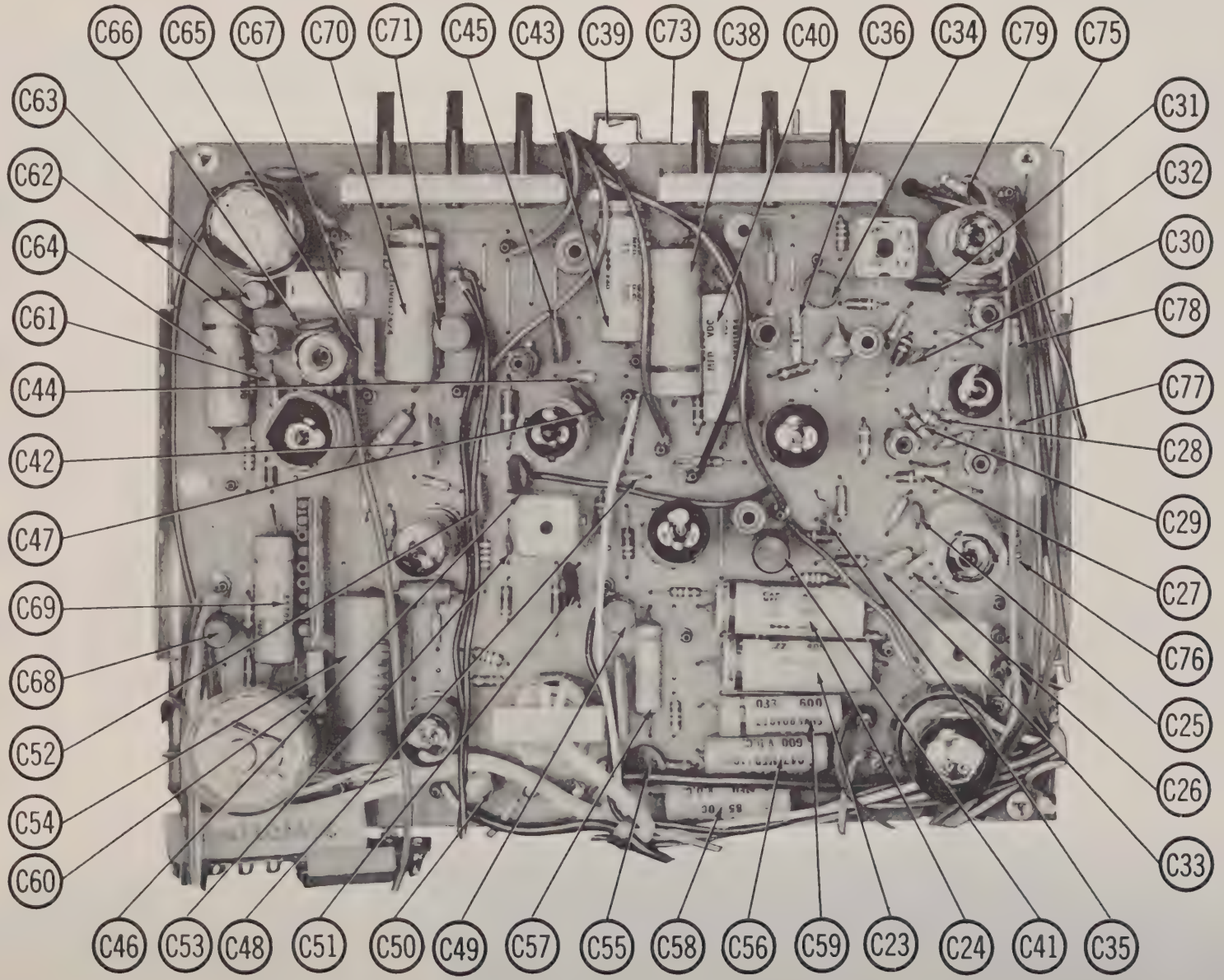
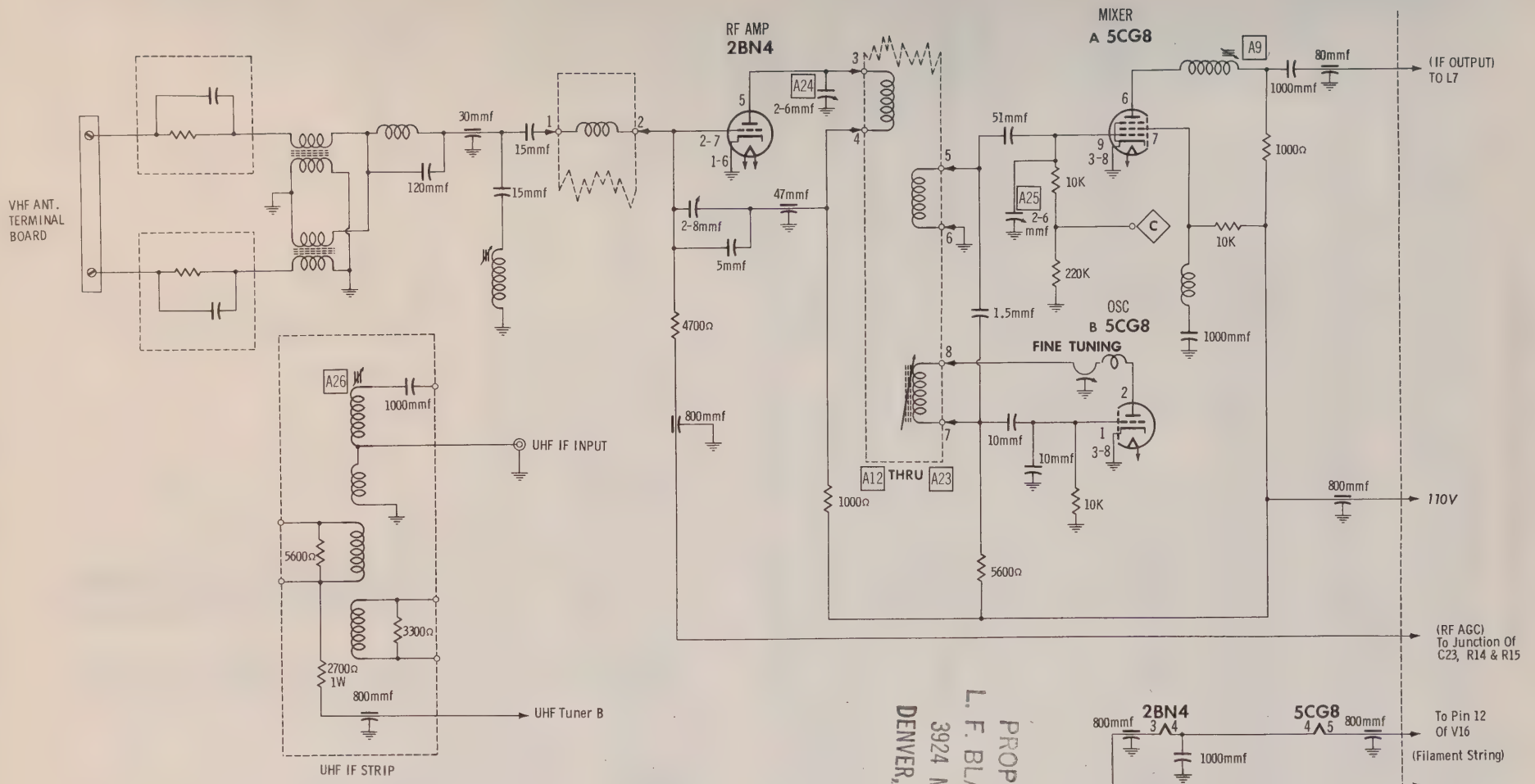


CHASSIS TOP VIEW - CAPACITOR IDENTIFICATION



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Howard W. Sams & Co., Inc. 1957

VHF Tuner Part #470V028M01

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ALTERNATE TUNER SCHEMATIC

GTM-4031, GTM-4131A

AIRLINE MODELS

ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

USE AN ISOLATION TRANSFORMER TO PROTECT THE TEST EQUIPMENT.
The high voltage lead should be securely taped and kept away from the chassis.

SOUND IF ALIGNMENT

Tune in a TV station and adjust the fine tuning for best picture. Connect an attenuator between the antenna and the receiver antenna terminals so that the signal may be varied from weak to strong.
Set the quieting control (R4A) to the center of its range.
Set the attenuator to MINIMUM attenuation (for strongest signal) and adjust A1 for maximum sound.
Reduce the signal 6 db with attenuator and adjust A2 for maximum sound. Reduce the signal strength to the lowest usable level and recheck A2.
Reduce the signal to the point that allows noise and hiss to be heared in the sound and adjust the quieting control for MINIMUM noise.

VIDEO IF ALIGNMENT

Connect the negative lead of a 3 volt bias supply to point Ⓐ. Positive to chassis.
Connect a 470MMF capacitor across the leads of the scope and the VTVM.
Keep the output of the signal generator adjusted to provide a constant 1 volt on the VTVM during the entire alignment.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough generator output to provide a usable indication on VTVM.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.001MFD	High side to pin 1 (grid) of 3CB6 (V5). Low side to chassis.	45.0MC	43.9MC	Any non-interfering channel	Vert. Amp. thru 47K to point Ⓑ. Low side to chassis.	A3, A4	Adjust A3 for maximum amplitude at marker. Adjust A4 to rock top of curve for correct shape of peak.
2.	"	High side to pin 1 (grid) of 3BZ6 (V3). Low side to chassis.	Not used	43.1MC	"	USE VTVM. DC probe thru 47K to point Ⓑ. Common to chassis.	A5	Adjust for maximum deflection.
3.	"	"	"	47.25MC	"	"	A6	Adjust for MINIMUM deflection.
4.	"	"	"	45.2MC	"	"	A7	Adjust for maximum deflection.
5.	"	"	45.0MC	41.25MC 42.25MC 43.0MC 45.0MC 45.75MC	"	Same as step 1.		Retouch A7 and A5 to produce response curve similar to Fig. 1.
6.	"	High side to point Ⓒ. Low side to chassis.	Not used	41.25MC	"	Same as step 2.	A8	Adjust for MINIMUM deflection.
7.	Fig. 2	Across antenna terminals thru termination network (Fig. 2).	"	215.75MC	13	"	Fine Tuning	"
8.	"	"	213.0MC	213.0MC	"	Same as step 1.	A9, A10	Adjust for maximum gain and symmetry of response similar to Fig. 3 with markers as shown. Adjust A9 for maximum amplitude. Adjust A10 for symmetrical response.

4.5MC TRAP ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
9.	.01MFD	High side to point Ⓑ. Low side to chassis.	4.5MC (400∿ 30% AM Mod)	Any non-interfering channel	RF probe to pin 11 (cathode) of picture tube. Common to chassis.	All	Adjust for MINIMUM deflection.

VHF OSCILLATOR ALIGNMENT

Connect bias as under "Video IF Alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning to the center of its range.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC	211.25MC 215.75MC	13	Vert. Amp. thru 47K to point Ⓑ. Low side to chassis.	A12	Adjust to place sound marker in trap notch as in Fig. 4. Video marker should fall at 50%.
			207MC	205.25MC 209.75MC	12		A13	
			201MC	199.25MC 203.75MC	11		A14	
			195MC	193.25MC 197.75MC	10		A15	
			189MC	187.25MC 191.75MC	9		A16	
			183MC	181.25MC 185.75MC	8		A17	
			177MC	175.25MC 179.75MC	7		A18	
			85MC	83.25MC 87.75MC	6		A19	
			79MC	77.25MC 81.75MC	5		A20	
			69MC	67.25MC 71.75MC	4		A21	
			63MC	61.25MC 65.75MC	3		A22	
			57MC	55.25MC 59.75MC	2		A23	

ALIGNMENT INSTRUCTIONS (cont)

VHF RF AND MIXER ALIGNMENT

Connect the negative lead of a 2.5 volt bias supply to point Ⓓ . Positive to chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
11.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	207MC	205.25MC 209.75MC	12	Vert. Amp. thru 10K to point Ⓒ. Low side to chassis.	A24, A25	Adjust for response curve similar to Fig. 5 with markers above 90%.
12.	"	"	213MC	211.25MC 215.75MC	13	"		Check for response similar to Fig. 5. If markers fall below 70% on any channel, make compromise adjustments of A24 and A25. with channel switch set to that channel. Check all other channels to see that they have not been seriously affected.
			201MC	199.25MC 203.75MC	11			
			195MC	193.25MC 197.75MC	10			
			189MC	187.25MC 191.75MC	9			
			183MC	181.25MC 185.75MC	8			
			177MC	175.25MC 179.75MC	7			
			85MC	83.25MC 87.75MC	6			
			79MC	77.25MC 81.75MC	5			
			69MC	67.25MC 71.75MC	4			
			63MC	61.25MC 65.75MC	3			
			57MC	55.25MC 59.75MC	2			

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UHF TUNER ALIGNMENT

Connect bias as under "Video IF Alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use 10MC sweep unless otherwise noted.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
13.	Fig. 2	Across UHF terminals thru matching network (Fig. 2).	605.0MC	603.25MC 607.75MC	36	Vert. Amp. thru 47K to point Ⓑ. Low side to chassis.	A26	Adjust output of sweep generator to provide 2 volts peak to peak on scope. Adjust A26 for response similar to Fig. 6. Check alignment at both ends of band. The response must fall within indicated limits.

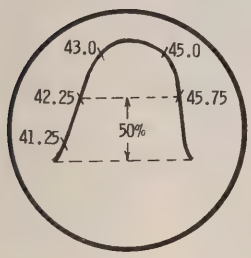
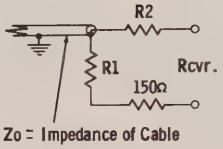


FIG. 1



Zo	R1	R2
50Ω	56Ω	120Ω
75Ω	82Ω	110Ω

FIG. 2

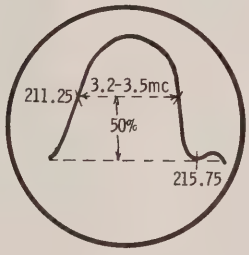


FIG. 3

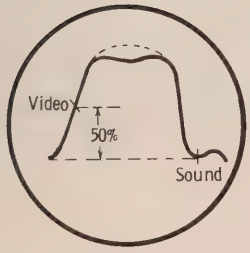


FIG. 4

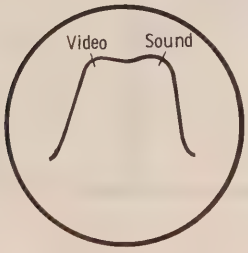


FIG. 5

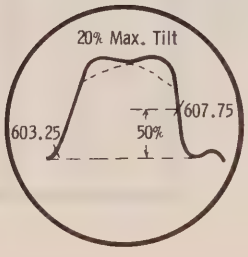
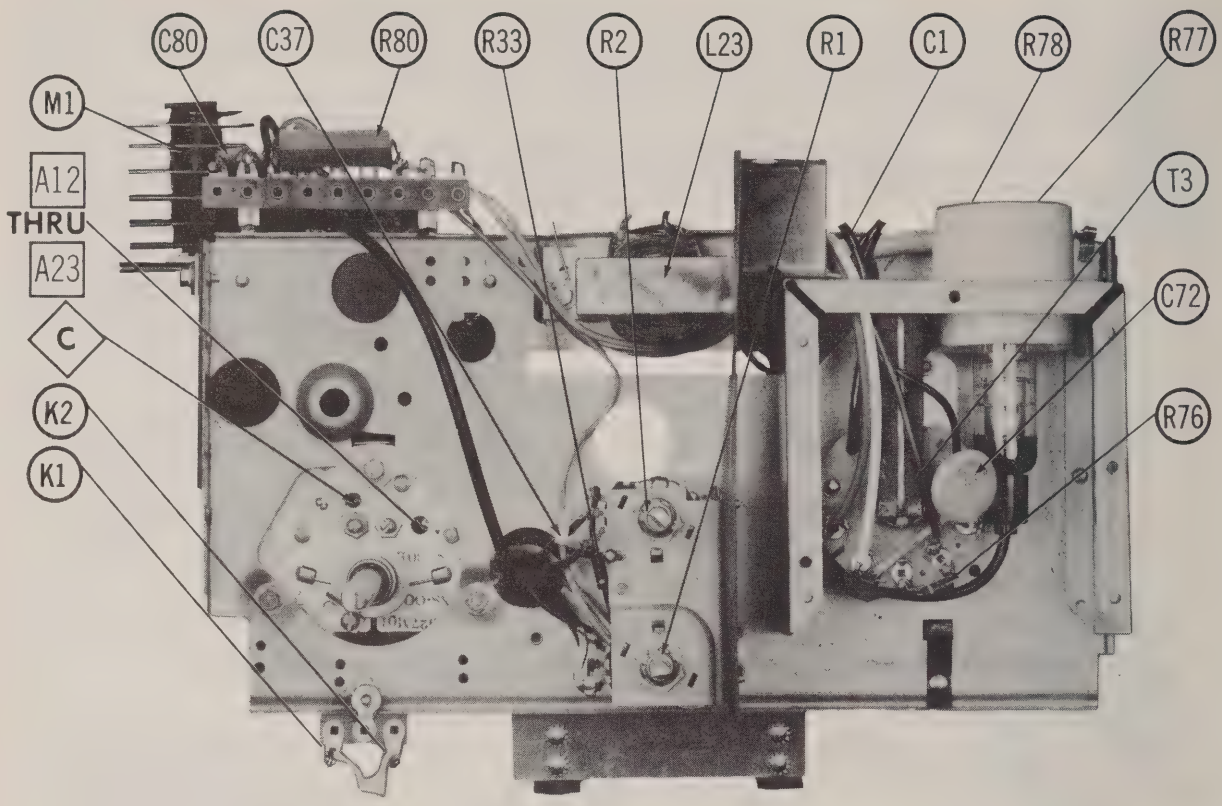
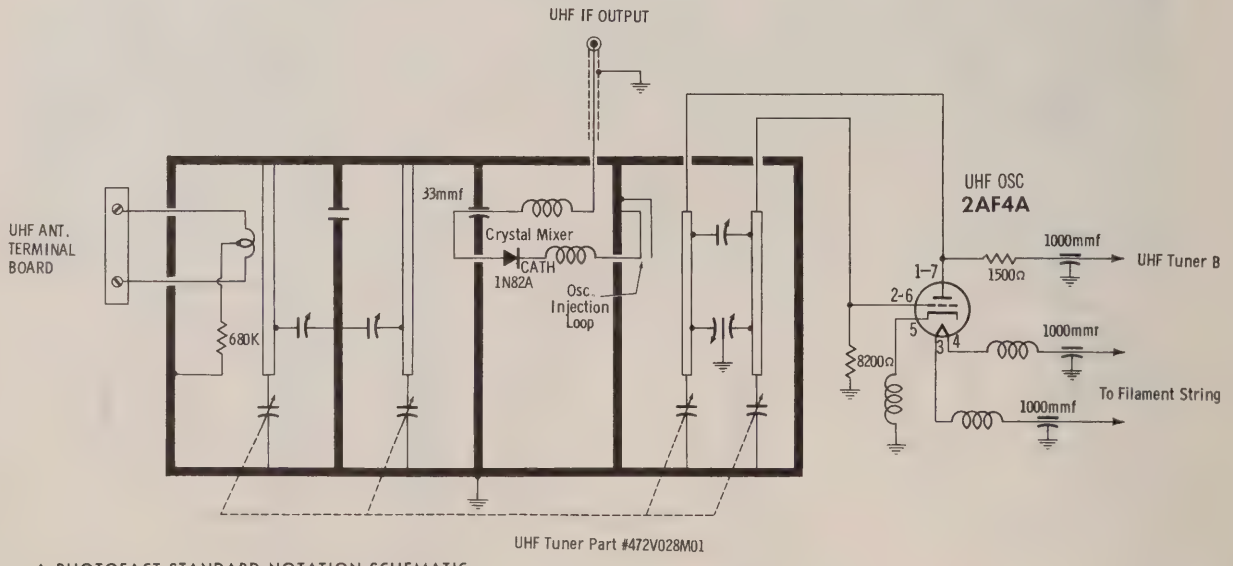


FIG. 6

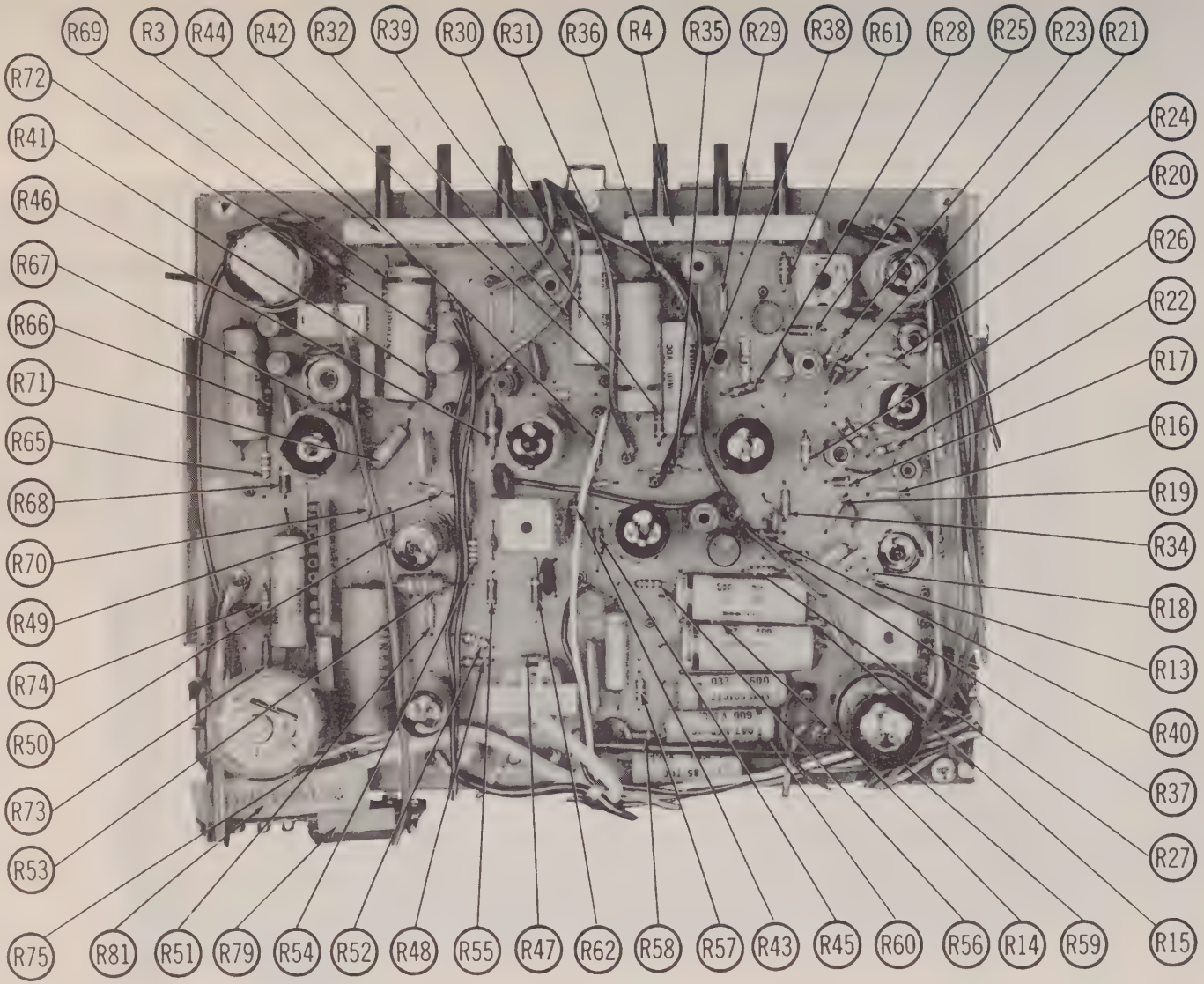


SHELF CHASSIS - TOP VIEW



A PHOTOFACT STANDARD NOTATION SCHEMATIC
Howard W. Sams & Co., Inc. 1957

ALTERNATE TUNER SCHEMATIC

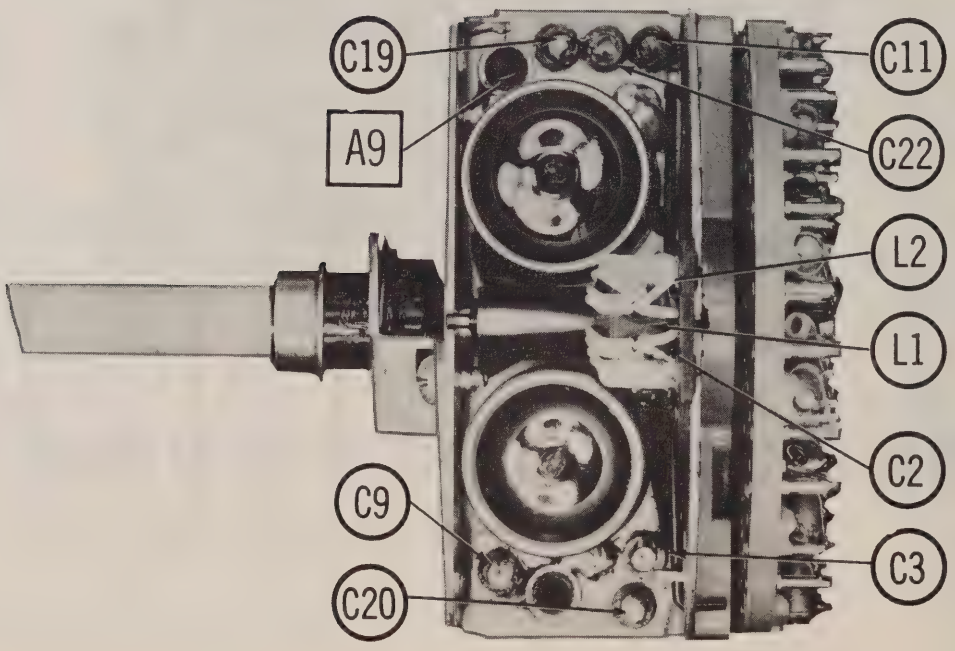


CHASSIS TOP VIEW - RESISTOR IDENTIFICATION

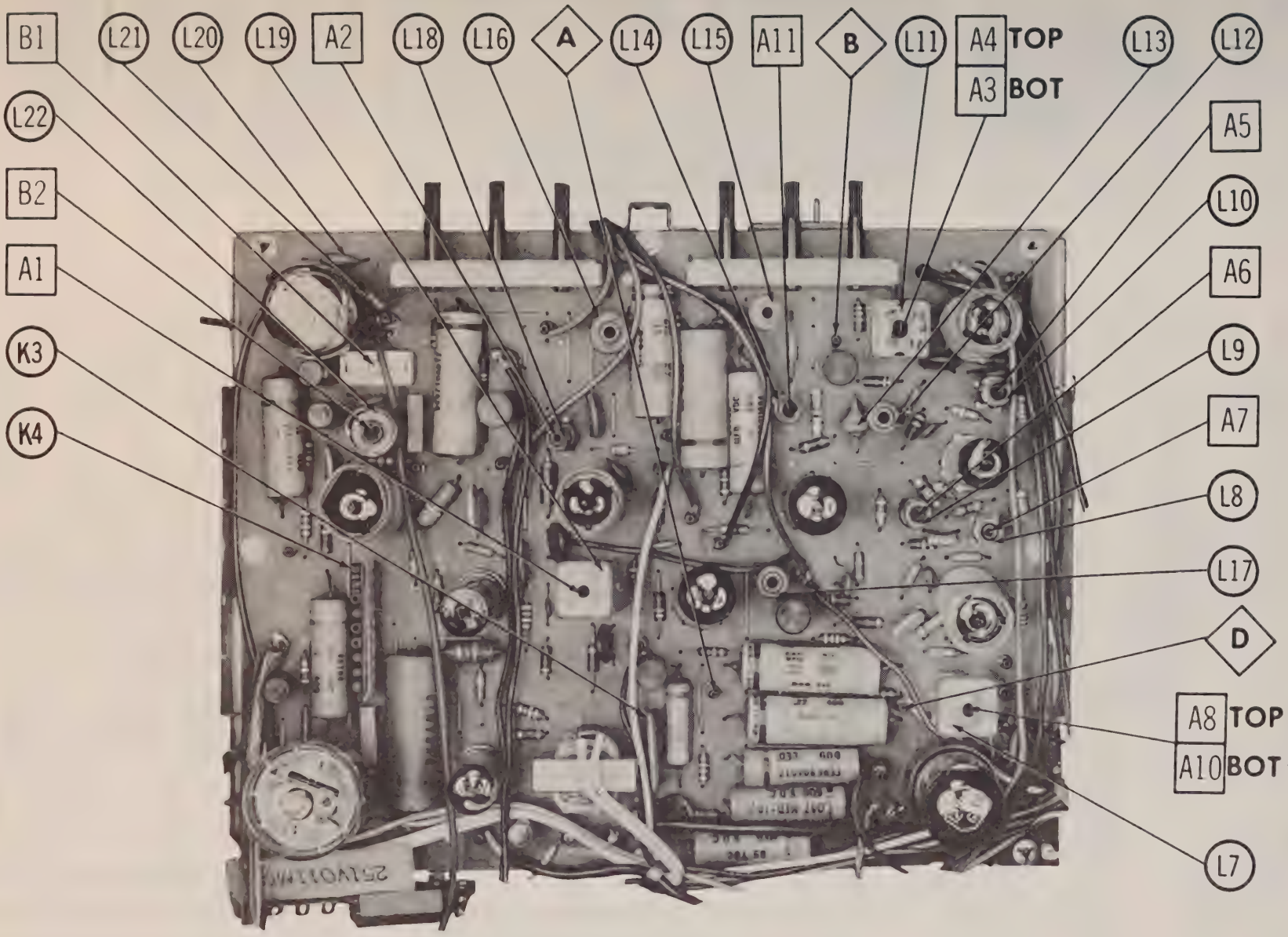
RESISTANCE MEASUREMENTS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	2BN4	0Ω	580K	4Ω	3.5Ω	†1200Ω	0Ω	580K		
V2	5CG8	10K	†5800Ω	0Ω	2.5Ω	3.5Ω	†1200Ω	†10K	0Ω	230K
V3	3BZ6	470K	47Ω	6Ω	5.5Ω	†670Ω	†670Ω	0Ω		
V4	3BZ6	480K	47Ω	5.5Ω	5Ω	†670Ω	†670Ω	0Ω		
V5	3CB6	.1Ω	150Ω	5Ω	4Ω	†670Ω	†670Ω	0Ω		
V6	6BH8	100Ω	10K	†5800Ω	10.5Ω	9.5Ω	120Ω	1Meg	†200Ω	†3900Ω
V7	3BN6	• 240Ω	.5Ω	11.5Ω	10.5Ω	†8400Ω	5.5Ω	‡560K		
V8	12C5	82Ω	0Ω	12.5Ω	15Ω	0Ω	†1100Ω	†850Ω		
V9	3CS6	27K	0Ω	11.5Ω	12.5Ω	†27K	†7000Ω	1.5Meg		
V10	6CN7	0Ω	1.7Meg	680K	0Ω	0Ω	0Ω	• 800K	• ‡5Meg	1Ω
V11	12W6GT	NC	9.5Ω	†190Ω	†70Ω	• 1.2Meg	NC	6Ω	0Ω	
V12	7AU7	‡345K	• 240K	1000Ω	21Ω	21Ω	†68K	2.4Meg	1000Ω	20Ω
V13	25DN6	NC	15Ω	0Ω	NC	470K	NC	20Ω	†1000Ω	TOP CAP ‡13Ω
V14	12D4	NC	NC	¶	NC	†20Ω	NC	24Ω	21Ω	
V15	1X2B	PINS 1 THRU 9 HAVE INFINITE RESISTANCE								TOP CAP ‡613Ω
V16	17BUP4	1Ω	100K	PIN 6 †200Ω	PIN 10 ‡1Meg	PIN 11 230K	PIN 12 2.5Ω			

† MEASURED FROM OUTPUT OF M1.
‡ MEASURED FROM PIN 3 OF V14.
• THIS READING WILL VARY. CONTROL SET FOR NORMAL OPERATION.
¶ THIS READING CAN VARY GREATLY, (10K MINIMUM), DUE TO THE CONDITION OF THE ELECTROLYTIC CAPACITOR CONNECTED IN THE ASSOCIATED CIRCUIT.
NC NO CONNECTION



RF TUNER TOP VIEW



CHASSIS TOP VIEW - INDUCTOR & ALIGNMENT IDENTIFICATION

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PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No	USE	TYPE	NOTES
V1	R.F. Amplifier	2BN4	
V2	Mixer-Oscillator	5CG8	
V3	1st. Video IF Amp	3BZ6	
V4	2nd. Video IF Amp	6BZ6	
V5	3rd. Video IF Amp	3CB6	
V6	Video Output	6BH6	
V7	Audio Detector	3BN6	
V8	Audio Output	1BC8	
V9	Sync Separator	3CS6	Note 1
V10	Vert. Mult-Horiz AFC	6CN7	
V11	Vert. Mult-Vert Output	12AW6GT	
V12	Horiz. Mult.	7AU7	Note 2
V13	Horiz. Output	25DN6	Note 3
V14	Damper	12D4	
V15	HV. Rectifier	1X2B	

Note 1. Some versions use a 3BY6 in this application.
Note 2. Some versions use a 6AU7 or a 6AU7A in this application.
Note 3 Some versions use a 21CM6GB in this application.

PICTURE TUBE

ITEM No	REPLACEMENT DATA: AIRLINE PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	NOTES
V16	17BUP4	17BUP4	Silver screen 85	

ELECTROLYTIC CAPACITORS

ITEM No	RATING: CAP.	VOLT	REPLACEMENT DATA: ADELINE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	4300	150	18EVG8M01	AFH354-01-85		FP417.5 TC40			
B	4200	150							
C	480	150							
D	30	150							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	VOLT	REPLACEMENT DATA: AIRLINE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C2	130		1L5LBSB12K	BPD-0001S2	DO-13I	L10T13	ED-130	UC-5313	5GA-T13	
C3	30		13M330E A30GJ-23							5%
C4	15		1SLBGP15K	NPO-81 15	DD-150	L10Q15	ED-15		5TCC-Q15	10%
C5	15		1SLBGP15Q	NPO-81 15	TCZ-15	C10Q15C	TCO-15		5TCC-Q15	5%
C6	3-8		21B-902-07							
C7	3-8		1SLBC05SD	NPO-81 5		C10V5C	TCO-5	ZT-5S5	5TCCB-V5	10%
C8	3-8		31B-902-01							
C9	800		13M330E A80Z-23							
C10	47		13M130U47GJ							
C11	800		13M330E A80Z-23							
C12	3-8		31B-902-01							
C13	51		1SLBQS01K							10%
C14	15		13D-41-8							+ .25MMF
C15	10		1SLBU10D							5% N750
C16	10		1SLBU A10D							N900
C17	1000		1SLBX02E	BPD-001	DD-102	BYA5DL	ED-1000	DC5L	5HK-DL	
C18	1000		1SLBX02Z	BPD-001	DD-102	BYA5DL	ED-1000	DC5L	5HK-DL	
C19	80		13M330E A80NH-23							
C20	800		13M330E A80Z-23							
C21	1000		1SLBX02E	BPD-001	DD-102	BYA5DL	ED-1000	DC5L	5HK-DL	
C22	800		13M330E A80LZ-23							
C23	.22	400		P488N-22		CU5AP22		GEM-4022	4TM-P22	
C24	.22	400		P488N-22		CU5AP22		GEM-4022	4TM-P22	
C25	800			BPD-0008	DD-801	L10T8	ED-800		5GA-T8	
C26	680			SI 680	DS-681	L7ET68	GP-680	UC-5368	5GA-T68	
C27	680			SI 680	DS-681	L7ET68	GP-680	UC-5368	5GA-T68	
C28	3.3		21TV03A39	NPO-81 3.3	TCZ-3R3	C10V3C	TCO-3.3		5TCC-V3	
C29	47			NPO-81 47	TCZ-47	C10Q47C	TCO-47	ZT-5447	5TCC-Q47	NPO 10%
C30	470			BPD-00047	DD-471	BYA5DL	ED-470	UC-5347	5GA-T47	
C31	1500	1000		BYD-15-1000	DD-152	BYA10DL5	HD15-1500	DC30215	5GA-D15	
C32	1500	1000		BYD-15-1000	DD-152	BYA10DL5	HD15-1500	DC30215	5GA-D15	
C33	4700	1000		BYD-15-4700	DD-472	BYA10D47	HD15-4700		5GA-D47	
C34	.047	400	20V0946M73			BC5S47J		ACE647	4SE-S47	
C35	2200			BPD-0022	DD-223	BYA10D22	ED-0022	UC-5223	5GA-D22	
C36	56									
C37	ST									N220 10%
C38	.22	400		P488N-22		CU5AP22		GEM-4022	4TM-P22	N220 10%
C39	ST									
C40	.1	400		P488N-1	DF-104	CU5AP1		GEM-401	4TM-P1	N220 10%
C41	.047	400	20V0946M73			BC5S47J		ACE647	4SE-S47	
C42	4700	1400	25V2300M01	HVD-15-4700	DD30-472	BYC20D47	HD15-4700		5GA-D47	
C43	.15	400		P488N-15		CU5AP15		GEM-4015	4TM-P15	
C44	6.8		21TV06A68	NPO-81 6.8	TCZ-6R8	C10V6BC	TCO-6.8	ZT-5568	5TCCB-V68	
C45	150									N220 10%
C46	4700	1000		BYD-15-4700	DD-472	BYA10D47	HD15-4700		5GA-D47	
C47	4700	1000		BYD-15-4700	DD-472	BYA10D47	HD15-4700		5GA-D47	
C48	800		25V3000M18	BPD-0008	DD-801	L10T8			5GA-T8	①
C49	1.2	800	20V0104M12			BC5S12J			4SE-S12	
C50	.0047	600	20V0104M73			BC5S47J		ACE5347	4SE-S47	
C51	4700	1000		HVD-15-4700	DD-472	BYA10D47	HD15-4700		5GA-D47	
C52	10000			BPD-01	DD-103	BYA5DL	ED-DL	DC5H	5GA-D10	
C53	270			BPD-00027	DD-271	L10T27	ED-270	UC-5327	5GA-T27	
C54	.47	600		P488N-47		CU5AP47		GEM-4047	4TM-P47	
C55	4700	1000		HVD-15-4700	DD-472	BYA10D47	HD15-4700		5GA-D47	
C56	.047	600	20V1104M02			BC5S47J		ACE5S11	4SE-S10	10%
C57	.0047	600	20V0104M05			BC5S47J		ACE5S11	4SE-S10	10%
C58	.033	600		P488N-033	DF-303	CU5B633		GEM-4133	4TM-S33	
C59	.033	600		P488N-033	DF-303	CU5B633		GEM-4133	4TM-S33	
C60	470		23Y1346M71	1484-00047		SR57J47			MS-347	10%
C61	4700	1000		HVD-15-4700	DD-472	BYA10D47	HD15-4700		5GA-D47	
C62	.01	600	20V1013M03			BC5S1J		ACE511	4SE-S10	
C63	.01	600	20V0104M03			BC5S1J		ACE511	4SE-S10	
C64	.1	400		P488N-1	DF-104	CU5AP1		GEM-401	4TM-P1	
C65	1000		23Y3113M08	1484-0001		1R5C1			MS-31	10%
C66	100									N220 10%
C67	18-180		21TV01M01							
C68	.01	600	20V1013M03			BC5S1J		ACE511	4SE-S10	
C69	.1	600		P488N-1	DF-104	CU5AP1		GEM-401	4TM-P1	
C70	.22	400		P488N-22		CU5AP22		GEM-4022	4TM-P22	
C71	.047	600	20V0104M73			BC5S47J		ACE5347	4SE-S47	10%
C72	100	5000	25Y3003M34							
C73	.15	600		P488M-15		CU5AP15		GEM-4015	4TM-P15	
C74	1000	1400	25Y3003M02	HVD-15-1000	DD30-102	BYB20DL	HD15-1000	DC30S1	30GA-U	
C75	470	3000	25Y3003M30	HVD-30-470	DD30-471	HVB30T47	HD30-470	DC30S47	30GA-T47	
C76	680			SI 680	DS-681	L7ET68	GP-680	UC-5368	5GA-T68	
C77	680			SI 680	DS-681	L7ET68	GP-680	UC-5368	5GA-T68	
C78	680			SI 680	DS-681	L7ET68	GP-680	UC-5368	5GA-T68	

CAPACITORS (cont)

ITEM No	RATING: CAP	VOLT	REPLACEMENT DATA: AIRLINE PART No	AEROVOX PART No	CENTRALAB PART No	CORNELL-DUBILIER PART No	ERIE PART No	MALLORY PART No	SPRAGUE PART No	NOTES
C79	6mf		9I 690	DS-691	L7ET68	GP-680	UC-5388 GEM-4681	5GA-T68 BL681		②
C80	.0022	1400								

1 Some versions may use a 470MMF in this application.
2 Some versions may use a .15MFD & 400V in this application.

CONTROLS

ITEM No	RATING: RESISTANCE	WATTS	REPLACEMENT DATA: ADLINE PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500K	½	270V0058M02		A47-500K-2		U48 Not Req.	Volume - Note 1
B	Shaft				FB-3		U5-38	
C	Switch				BWE-21		U38	
R2A	15K	½	270V0038M05	B-20	A47-15K-8	BU-118		Picture - Note 2
B	Shaft			Not Req.	FB-3	BU	Not Req.	
R3A	500K	½	270V0058M02					Vert. Lin.
B	5Meg							Vert Hold
C	100K							Brightness
R4A	800Ω	½	270V0139M02					Quieting
B	5Meg							Height
C	80K							Horiz. Hold

Note 1. Alternate part #270V0378M01 may be used in some versions.
Note 2. Alternate part #270V0230M04 may be used in some versions.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING: OHMS	WATT	REPLACEMENT DATA: AIRLINE PART No.	IRC PART No.	NOTES
R3	4700Ω			BTS-4700	
R6	1000Ω			BTS-1000	
R7	10K			BTS-10K	
R8	220K			BTS-330K	
R9	1000Ω			BTS-1000	
R10	10K			BTS-10K	
R11	10K			BTS-10K	
R12	5600Ω			BTS-5600	
R13	3900Ω			BTS-3900	
R14	100K				
R15	18Meg 5%		250V21AA68	BTS-18Meg 5%	
R16	3900Ω				
R17	470Ω			BTS-470	
R18	47Ω			BTS-47	
R19	8200Ω				
R20	3900Ω				
R21	470Ω			BTS-470	
R22	47Ω			BTS-47	
R23	470Ω			BTS-470	
R24	1500			BTS-150	
R25	4300Ω 5%		25V2I4A52	BTS 4300 5%	
R26	470K			BTS-470K	
R27	47K			BTS-47K	
R28	1Meg				
R29	8200Ω				
R30	2700Ω			BTS-3700	
R31	2700Ω			BTS-3700	
R32	6800Ω				
R33	2700Ω			BTS-3700	
R34	1200			BTS-130	
R36	10K				
R38	22K			BTS-22K	
R37	5600Ω			BTS-5800	
R39	100Ω			BTS-100	
R40	100K			BTS-3300	
R41	1Meg			BTS-1Meg	
R42	220K			BTS-220K	
R43	470Ω			BTS-470	
R44	560K			BTS-560K	

ITEM No.	RATING: OHMS	WATT	REPLACEMENT DATA: AIRLINE PART No.	IRC PART No.	NOTES
R45	15K			BTS-15K	
R46	8200Ω	1	250V32BA32	BTA-8200	
R47	560Ω			BTS-560	
R48	82Ω			BTS-82	
R49	27K			BTS-27K	
R50	56K			BTS-56K	
R51	33K			BTS-33K	
R52	56K			BTS-56K	
R53	6800Ω	2		BTS-6800	
R54	470K			BTS-470K	
R55	1Meg			BTH-1Meg	
R56	82K			BTS-82K	
R57	27K			BTS-27K	
R58	8200Ω 5%		250V2EAA32	BTS-8200 5%	
R59	180Ω			BTS-180	
R60	1Meg			BTH-1Meg	
R61	68K			BTS-68K	
R62	2.2Meg			BTH-2.2Meg	
R63	5600				
R64	560Ω				
R65	47K			BTS-47K	
R66	470K			BTS-470K	
R67	68K 5%	1	250V318A83	BTA-68K 5%	
R68	1000Ω			BTS-1000	
R69	220K			BTS-320K	
R70	220K			BTS-220K	
R71	330K	1	250V323A34	BTA-330K	
R72	15K			BTS-15K	
R73	150Ω			BTS-150	
R74	470K			BTS-470K	
R75	1000Ω	1	250V32IA02	BTA-1000	
R78	2300Ω				
R79	2.2Ω		25IV002A39	BWJ-2.2	
R78	100K	1	V-9937-18	BTA-100K	
R79	560Ω	4	250V020M07		
R80	180Ω	4	25IV020M05		
R81	90Ω	10	25IV011M05	PW10-90	
R83	4.7Ω	5	25BV004M05		
R83	330K			BTS-330K	

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA: AIRLINE PART No.	Halldorson PART No	Merit PART No	Ram PART No	Stancor PART No	Thordarson PART No	Triad PART No	NOTES
T1	Vert. Output	430V033M03	21900 ①	A-5323 ②				A-108X	
T2A	Yoke-Horiz DY 85MΩ	495V003M06	DF807	MDF-92	T90T18/43	DY-16A	Y-16	Y-41 &	
B	(90°)-Vert. (DS. 85MΩ)		① ③	② ③	② ③	③ ③	③ ③	WW1 ③	
M4	Yoke Cover & Centering Device	78IV081M01							
	Yoke Clamp	78AV034M04							
T3	Horiz. Output	495V004M04		HVO-154			FLY-86 *		

① Use 8 to 1 turns ratio.
② Connect screen grid of vertical output tube (V11) to B+.
③ Requires new rear cover, centering device and yoke clamping device. Use original yoke damping network, if necessary.
④ To mount same as original connect yoke terminal #1 to horizontal output terminal #4, terminal #3 to horizontal output terminal #3, terminals #2 and #7 to resistor R76. To mount with leads out bottom, connect terminal #3 to horizontal output terminal #4, terminal #1 to horizontal output #3, terminals #2 and #7 to resistor(R76)

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
6						6	
5						5	
4						4	
7						7	
3						3	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE: PRI	SEC	REPLACEMENT DATA: AIRLINE PART No.	Halldorson PART No	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T4	2400Ω	3-4Ω	430V031M01	21J01 ①	A-3025 ①	A-3323 ①	26S68	S-12X ①	① Use original channel mounting frame and terminal board

SPEAKER

ITEM No.	TYPE: SIZE	FIELD	V C IMP	REPLACEMENT DATA: AIRLINE PART No.	GUAM PART No	NOTES
SP1	4	PM	3-4Ω	570V015M01	4A07	

COILS (RF-IF)

ITEM No.	USE	AIRLINE PART No.	NOTES
L1	Ant. Trans.	31T-3066-01	
L8	IF Trap Coil	34A-783	
L9	IF Trap Coil	34A-783	

ITEM No.	USE	AIRLINE PART No.	NOTES
L4	RF Choke	36A-I16	
L5	RF Choke	36A-I1-01	
L6	Mixer Plate Coil	31U-580	

ITEM No.	USE	REPLACEMENT DATA: AIRLINE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L7	1st. Video IF	23SV003M01				Includes 41.25MC Trap
L8	2nd. Video IF	23SV004M01				
L9	47.25MC Trap	23SV003M01				
L10	3rd. Video IF	23SV004M01				
L11	4th. Video IF	23SV005M01				
L12	Series Peaking Coil	V-15796-1	19-2100	TV-1I1	6I13	Includes coil, caps & MI
L13	Shunt Peaking Coil	V-15460-5		TV-190	6I33	150 Microhenries
L14	4.5MC Trap	V-15796-1				
L15	Series Peaking Coil	V-15796-3	19-2135			140 Microhenries
L16	Shunt Peaking Coil	V-15796-6		TV-190	6I33	150 Microhenries
L17	Series Peaking Coil	V-15796-1	19-2100	TV-1I1	6I13	100 Microhenries
L18	Sound IF	V-15795-2				
L19	Quadrature Coil	23SV007M02				
L20	RF Choke	23SV019M10	19-1008		4634	14 Microhenries
L21	RF Choke	23SV019M10	19-1008		4634	14 Microhenries

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES.: PRI.	SEC.	REPLACEMENT DATA: AIRLINE PART No	MEISSNER PART No	MERIT PART No	MILLER PART No	RCA TYPE No	Ram PART No	Thordarson PART No	NOTES
L22	90Ω		23SV005A01							

FILTER CHOKE

ITEM No.	RATINGS: TOTAL DIRECT CURRENT	D.C. RESISTANCE	INDUCTANCE TO CURRENT 1000 Cy.	REPLACEMENT DATA: AIRLINE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L23	260A	19Ω	43 HY.	420V032M01					C-24X

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	AIRLINE PART No	REPLACEMENT DATA
K1	Antenna Isolation	330MMF, 230K	219V004M03	Centralab RC-431
K3	Antenna Isolation	330MMF, 230K	219V004M03	Centralab RC-431
K3	Vert. Integrator	2000MMF, 5000MMF, 9000MMF, 22K, 82000, 820KΩ	PC-104	Aerovox PA-801 Centralab PC-104 Sprague 103C13 Erie 1406-01 Cornell-Dubilier 1HFM3
K4	AFC Circuit	390MMF, 82MMF, 82MMF, 680MMF, 1Meg,47000, 12K, 220K, 680K	219V023M01	Erie 709-01

RECTIFIERS

ITEM No.	RATING: CURRENT (Measured)	REPLACEMENT DATA: AIRLINE PART No.	FEDERAL PART No.	GENERAL ELECTRIC PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	NOTES
M1	300A	295V005M02 ① ②	1023A ①	1N1007 ①	MR350 ①	350A ①	① Selenium type ② Alternate part #295V005M01 ③ Germanium type

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA: AIRLINE PART No.	CBS PART No.	SYLVANIA PART No.	NOTES
M2	K6 (JN295)	1N80	1N34A	Video Detector	

MISCELLANEOUS

ITEM No	PART NAME	AIRLINE PART No.	NOTES
M3	Tuner	470V027M01	VHF
	Tuner	470V028M01	VHF
	Tuner	472V028M01	UHF
M4	Centering Device	78IV081M01	Includes centering device and yoke cover
M5	Ion Trap	157V530A04	

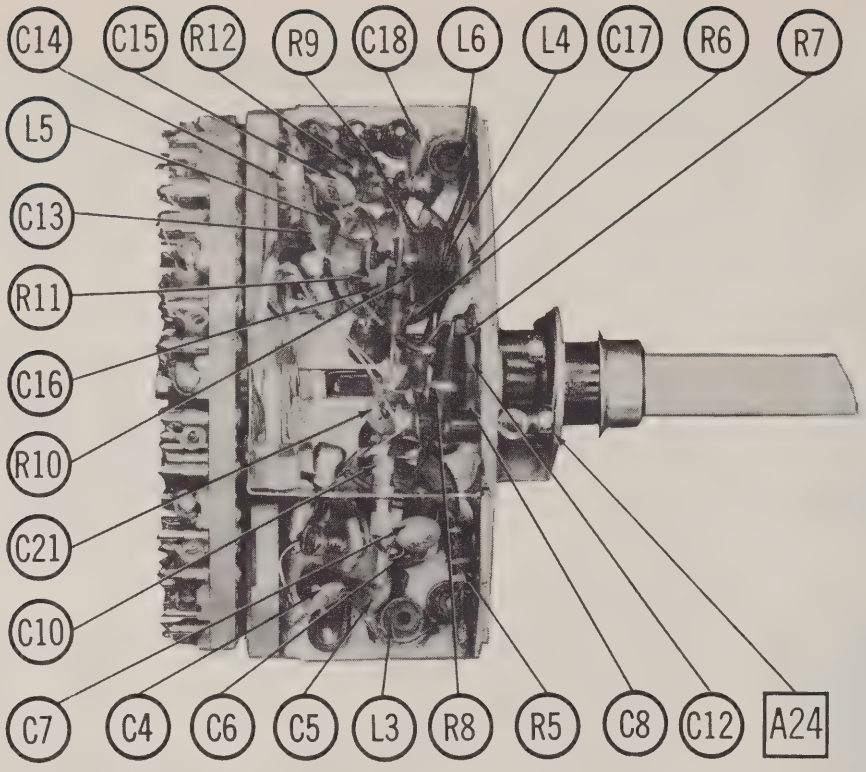
CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Mask	61SV003M10	
Knob	550V032M09	VHF Channel Selector
Knob	550V031M04	VHF Fine Tuning
Knob	550V050M05	UHF Channel Selector
Knob	V-14653-15	On-off-volume, picture

AIRLINE MODELS GTM-4031, GTM-4131A

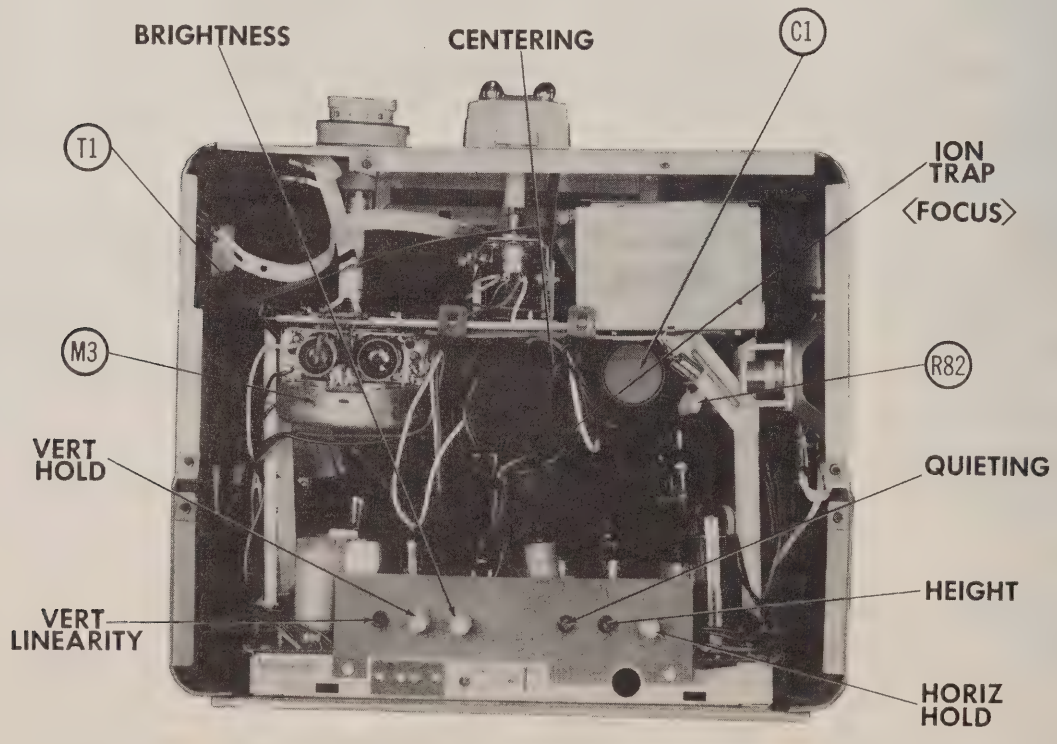
FOLDER 2



RF TUNER BOTTOM VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Connect a clip lead across the horizontal frequency coil (L22). This can be done from the top of the chassis.	With the receiver tuned to a TV station, adjust the horizontal multivibrator trimmer (B1) for zero volts on the VTVM.
Set the horizontal hold control (R4C) to the center of its range.	Remove the clip lead from L22.
Connect the DC probe of the VTVM to pin 7 (grid) of the 7AU7 (V12). Common to chassis.	Adjust the horizontal frequency coil (B2) for zero volts on the VTVM. Check the lock-in action on all channels.



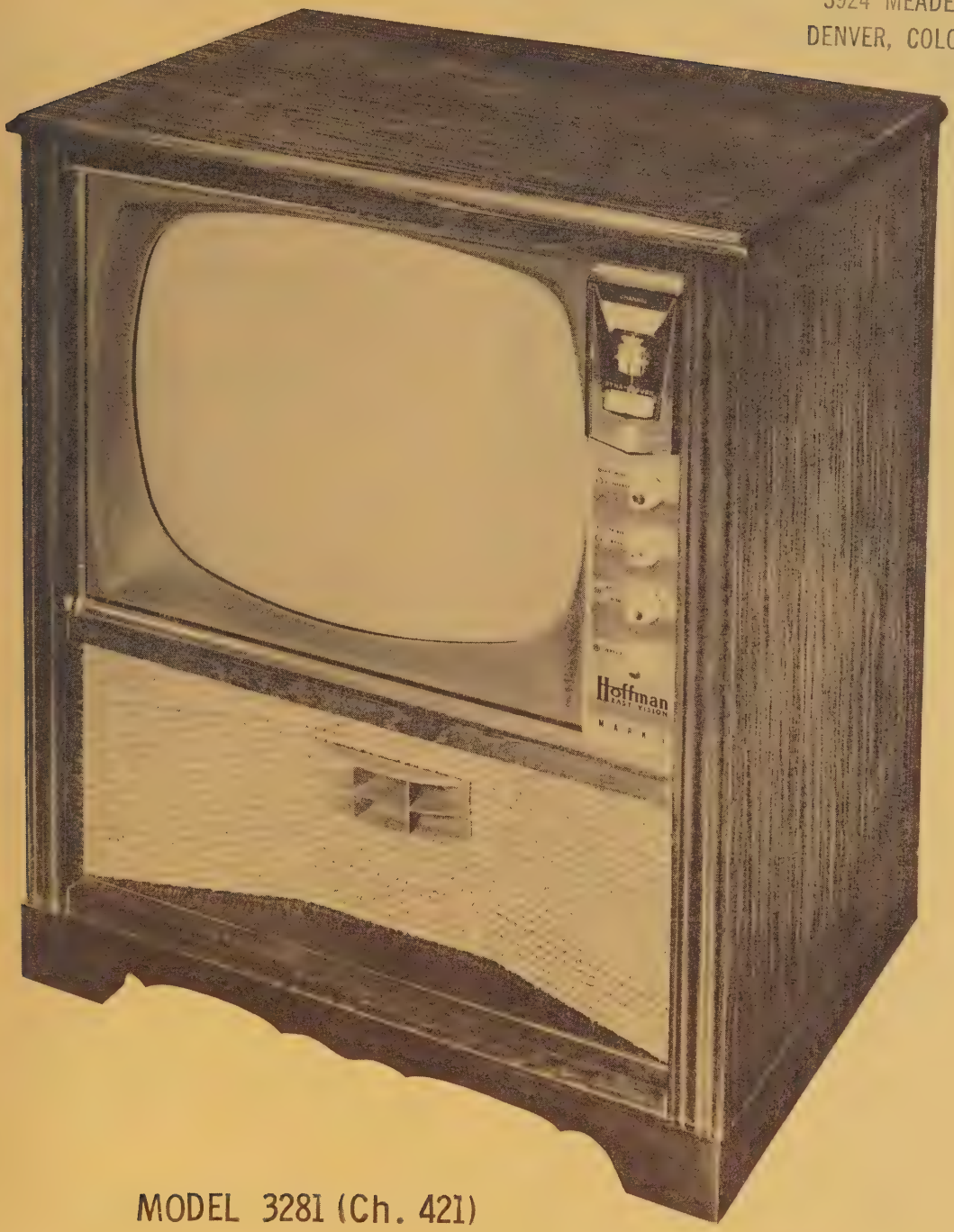
CABINET—REAR VIEW

PHOTOFACT* Folder

*TRADE MARK

HOFFMAN MODELS M3281, U, P3281, U, B3291, U (Ch. 421, U)

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO



MODEL 3281 (Ch. 421)

HOFFMAN MODELS M3281, U, P3281, U, B3291, U (Ch. 421, U)

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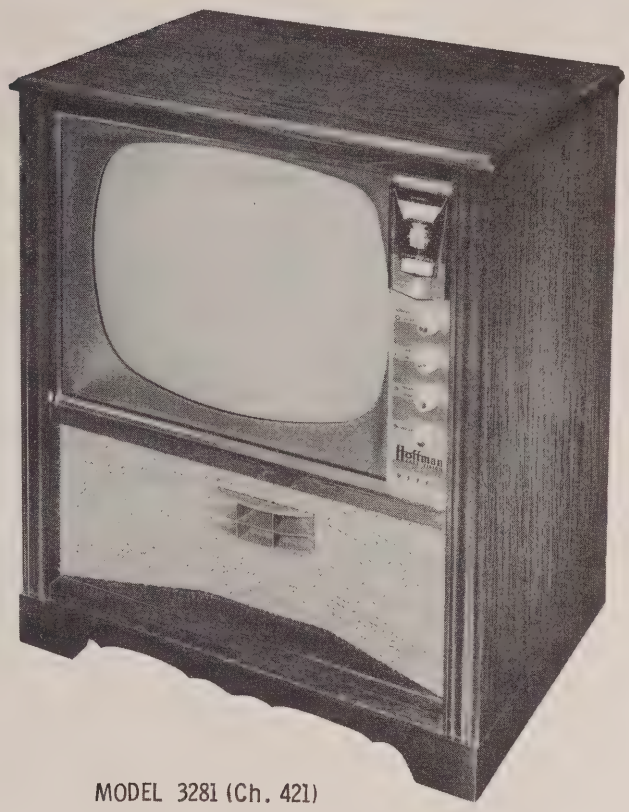
HOFFMAN MODELS M3281, U, P3281, U, B3291, U (Ch. 421, U)

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 7 push-on type control knobs from the front.
2. Loosen 7 wood screws, slide rear cover up and remove.
3. Remove the picture tube socket, yoke plug, HV lead, power tuning plug and 2 speaker leads.
4. Remove 1 wood screw from the upper chassis brace.
5. Remove 2 chassis bolts from the bottom.
6. Remove the chassis.
7. Remove 10 wood screws and 3 speakers.



MODEL 3281 (Ch. 421)

HOFFMAN MODELS M3281, U, P3281, U, B3291, U (Ch. 421, U)

TRADE NAME	Hoffman	MODELS	CHASSIS
		B3291, M3281, P3281	421
		B3291U, M3281U, P3281U	421U
MANUFACTURER	Hoffman Radio Corp., 6200 S. Avalon Blvd., Los Angeles 3, Calif.		
TYPE SET	Television Receiver		
TUBES	Twenty-one		
POWER SUPPLY	110-120 Volts AC, 60 Cycle	RATING 210 Watts, 1.9 Amp. @ 117 Volts AC	
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)		

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustment of the VHF oscillator is possible by removing the channel selector and fine tuning knobs. Set the fine tuning at the center of its range. The adjustments are accessible, one at a time, as the channel selector is rotated. Adjust for best picture and sound.

PICTURE TUBE SAFETY GLASS CLEANING

Remove 4 wood screws and the trim at the top edge of the safety glass.

FOCUS

The focus may be varied by means of a screw in the focus magnet. Using a non-ferrous screwdriver, adjust the screw in or out for best focus.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

The horizontal frequency coil is used as the horizontal hold control. Adjust the horizontal hold until the picture synchronizes horizontally. (For location, see tube placement chart).

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (A3) located on top of chassis.

CENTERING

Centering is accomplished mechanically by means of a centering arm. Adjust the arm from side to side, and up and down until the picture is properly centered.

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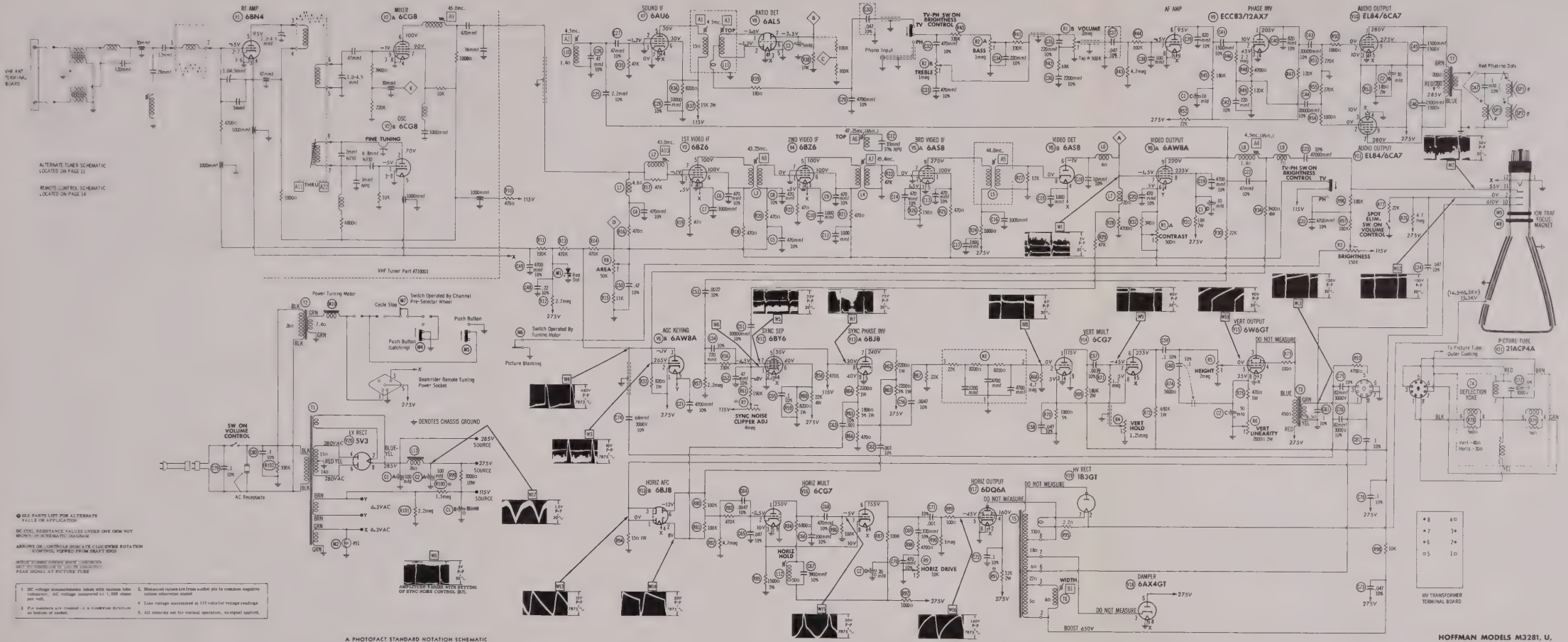
RF AMP V1 6BN4
MIXER V2A 6CG8
OSC V2B 6CG8
FINE TUNING
VHF ANT TERMINAL BOARD
ALTERNATE TUNER SCHEMATIC LOCATED ON PAGE 11
REMOTE CONTROL SCHEMATIC LOCATED ON PAGE 14
VHF Tuner Part #71001
SOUND IF V7 6AU6
RATIO DET V8 6AL5
TV-PH SW ON BRIGHTNESS CONTROL TV
Phono Input
VOLUME
BASS
TREBLE
AF AMP V9 ECC83/12AX7
PHASE INV
AUDIO OUTPUT V10 EL84/6CA7
AUDIO OUTPUT V11 EL84/6CA7
Red Phasing Dots
1ST VIDEO IF V3 6BZ6
2ND VIDEO IF V4 6BZ6
3RD VIDEO IF V5A 6AS8
VIDEO DET V5B 6AS8
VIDEO OUTPUT V6A 6AW8A
TV-PH SW ON BRIGHTNESS CONTROL TV
SPOT ELIM. SW ON VOLUME CONTROL
CONTRAST
BRIGHTNESS
AREA
ION TRAP FOCUS MAGNET
PICTURE TUBE V21 21ACP4A
To Picture Tube Outer Coating
DEFLECTION YOKE
AGC KEYING V5B 6AW8A
SYNC SEP V12 6BY6
SYNC PHASE INV V11A 6BJ8
SYNC NOISE CLIPPER ADJ
VERT MULT V14 6CG7
VERT OUTPUT V13 6W6GT
DO NOT MEASURE
HEIGHT
VERT HOLD
VERT LINEARITY
HORIZ AFC V15B 6BJ8
HORIZ MULT V16 6CG7
HORIZ OUTPUT V17 6DQ6A
HV RECT V19 1B3GT
HORIZ HOLD
HORIZ DRIVE
WIDTH
DAMPER V18 6AX4GT
BOOST 650V
HV TRANSFORMER TERMINAL BOARD
Power Tuning Motor
Cycle Stop
Switch Operated By Channel Pre-Selector Wheel
Push Button
Push Button (Latching)
Beamrider Remote Tuning Power Socket
Switch Operated By Tuning Motor
Picture Blanking
SW ON VOLUME CONTROL
AC Receptacle
LV RECT V20 5V3
DENOTES CHASSIS GROUND
285V SOURCE
275V SOURCE
115V SOURCE
6.3VAC
ADJUSTED FOR BEST SYNC NOISE CONTROL ACTION
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC VOL. RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION CONTROL VIEWED FROM SHAFT END
PEAK SIGNAL AT PICTURE TUBE
1. DC voltage measurements taken with vacuum tube voltmeter. AC voltage measured at 1,000 ohms per volt.
2. Pin numbers are counted as a clockwise direction as bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated
4. Line voltage maintained at 117 volts for voltage readings
5. All controls set for normal operation, no signal applied.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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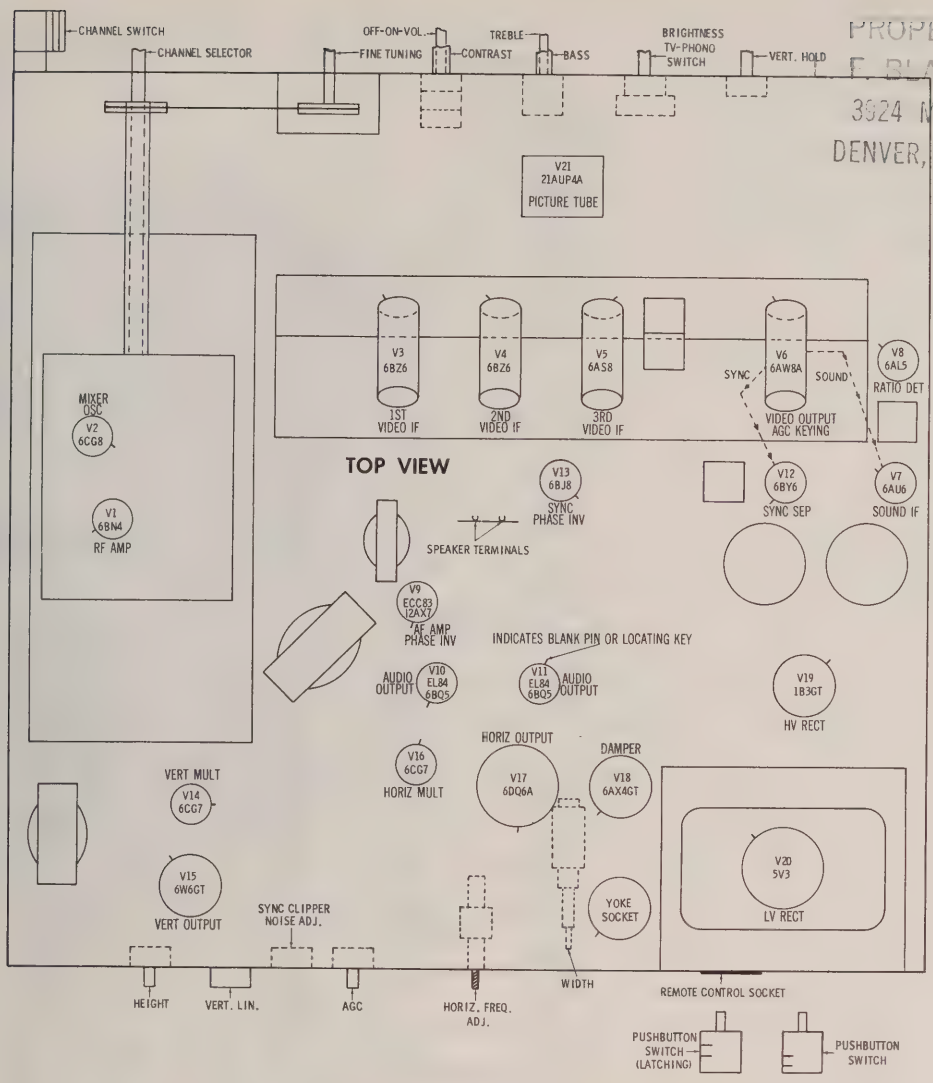
HOFFMAN MODELS M3281, U, P3281, U, B3291, U (Ch. 421, U)

TUBE PLACEMENT CHART



PROPERTY OF
E. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

TUBE FAILURE CHECK CHART

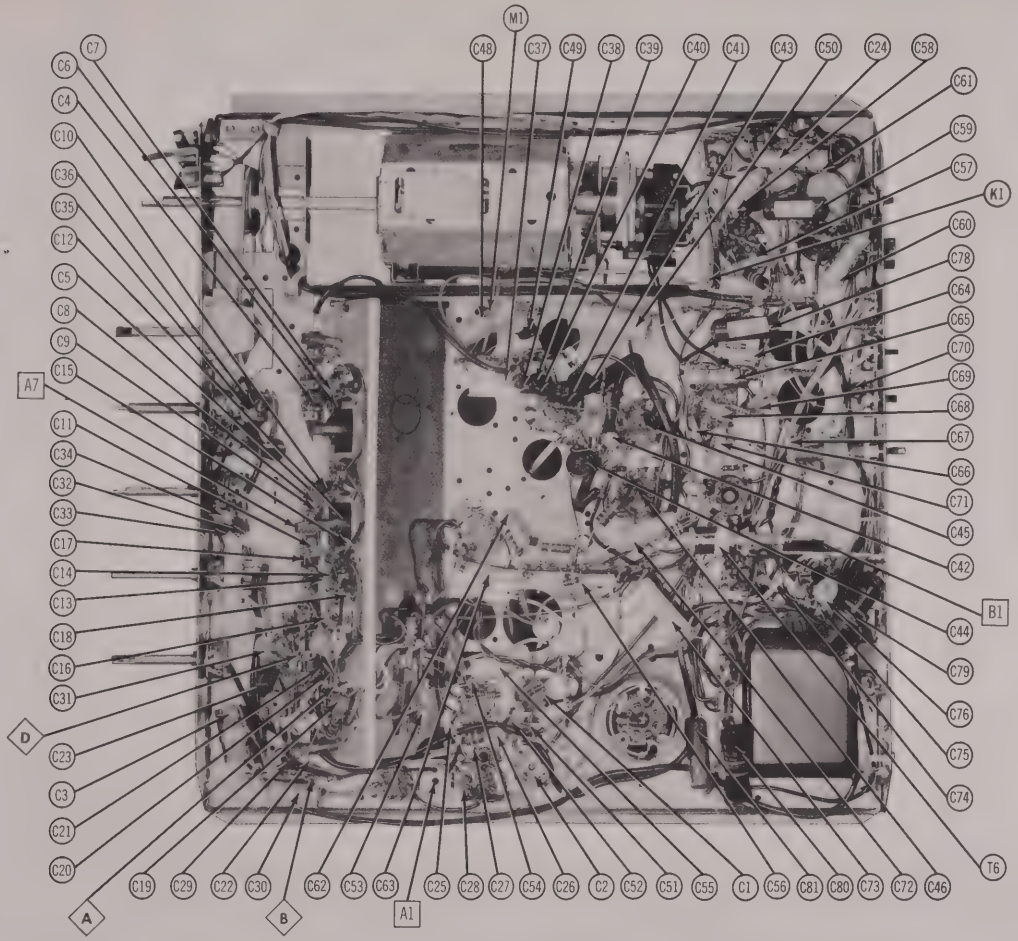
The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - V20

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V3, V4, V5, V6
No pic, no sound, has snow - V1, V2, V3
No pic, has sound, has raster - V6, V21
Has pic, no sound - V7, V8, V9, V10, V11
Overloaded picture - V6, Diode (M1)

SYNC FAILURE
No vert. sync - V12, V13
No horiz. sync - V12, V13
No vert. or horiz. sync - V12, V13

SWEEP FAILURE
No raster, has sound - V13, V16, V17, V18, V19, V21
No vertical deflection - V14, V15
Poor vert. linearity or foldover - V14, V15
Poor horiz. linearity or foldover - V16, V17, V18
Narrow picture - V16, V17, V18, V20
Vert. off freq. - V14
Horiz. off freq. - V16



CHASSIS BOTTOM VIEW-CAPACITOR AND ALIGNMENT IDENTIFICATION

ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

The high voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.

SOUND IF ALIGNMENT

Connect two matched 100K (±1%) resistors in series from point Ⓑ to chassis. The junction of these two resistors is alignment point Ⓒ as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	.001MFD	High side to point Ⓐ. Low side to chassis.	4.5MC (Unmod)	Between any two channels	DC probe thru 10K to point Ⓑ. Common to chassis.	A1, A2	Adjust for maximum deflection.
2.	"	"	"	"	DC probe to point Ⓑ. Common to point Ⓒ.	A3	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

4.5MC TRAP ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
3.	.001MFD	High side to point Ⓐ. Low side to chassis.	4.5MC (Unmod)	Between any two channels	DC probe thru detector (Fig. 1) to pin 11 (cathode) of picture tube. Common to chassis.	A4	Adjust for MINIMUM deflection.

VIDEO IF ALIGNMENT

Connect a 1000MMF capacitor across the input terminals of the VTVM and the scope.
Connect the negative lead of a 3 volt bias supply to point Ⓓ. Positive to chassis.
Set the contrast control fully counter clockwise.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough generator output to provide a usable indication on VTVM.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
4.	.005MFD	High side to point Ⓔ. Low side to chassis.	Not used	44.0MC	Between any two channels	DC probe thru 10K to point Ⓐ. Common to chassis.	A5	Adjust for maximum deflection.
5.	"	"	"	47.25MC	"	"	A6	Adjust for MINIMUM deflection.
6.	"	"	"	45.4MC	"	"	A7	Adjust for maximum deflection.
7.	"	"	"	43.25MC	"	"	A8	Adjust for maximum deflection.
8.	"	"	"	43.0MC	"	"	A9	Adjust for MINIMUM deflection.
9.	"	"	"	43.0MC	"	"	A10	Adjust for maximum deflection.
10.	"	"	"	45.0MC	"	"	A9	Adjust for maximum deflection.
11.	"	"	44.0MC	45.0MC 45.75MC	"	"		Check for response similar to Fig. 2. If necessary, retouch A5, A7 and A8 SLIGHTLY for desired response.

VHF OSCILLATOR ALIGNMENT

Connect bias as under "Video IF Alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning to the center of its range.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
12.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC	211.25MC 215.75MC	13	Vert. Amp. thru 47K to point Ⓐ. Low side to chassis.	A11	Adjust to place sound marker in trap notch as in Fig. 3. Video marker should fall at 50%.
			207MC	205.25MC 209.75MC	12		A12	
			201MC	199.25MC 203.75MC	11		A13	
			195MC	193.25MC 197.75MC	10		A14	
			189MC	187.25MC 191.75MC	9		A15	
			183MC	181.25MC 185.75MC	8		A16	
			177MC	175.25MC 179.75MC	7		A17	
			85MC	83.25MC 87.75MC	8		A18	
			79MC	77.25MC 81.75MC	5		A19	
			69MC	67.25MC 71.75MC	4		A20	
			63MC	61.25MC 65.75MC	3		A21	
			57MC	55.25MC 59.75MC	2		A22	

ALIGNMENT INSTRUCTIONS (cont)

RF AND MIXER ALIGNMENT

This portion of the receiver has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.

UHF ALIGNMENT

This portion of the receiver has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.

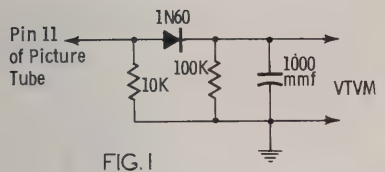


FIG. 1

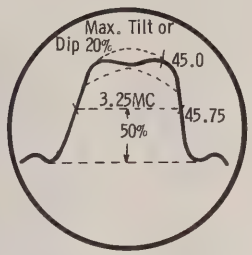


FIG. 2

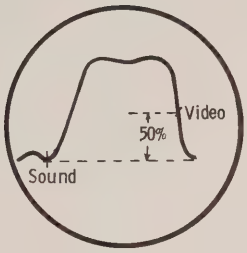
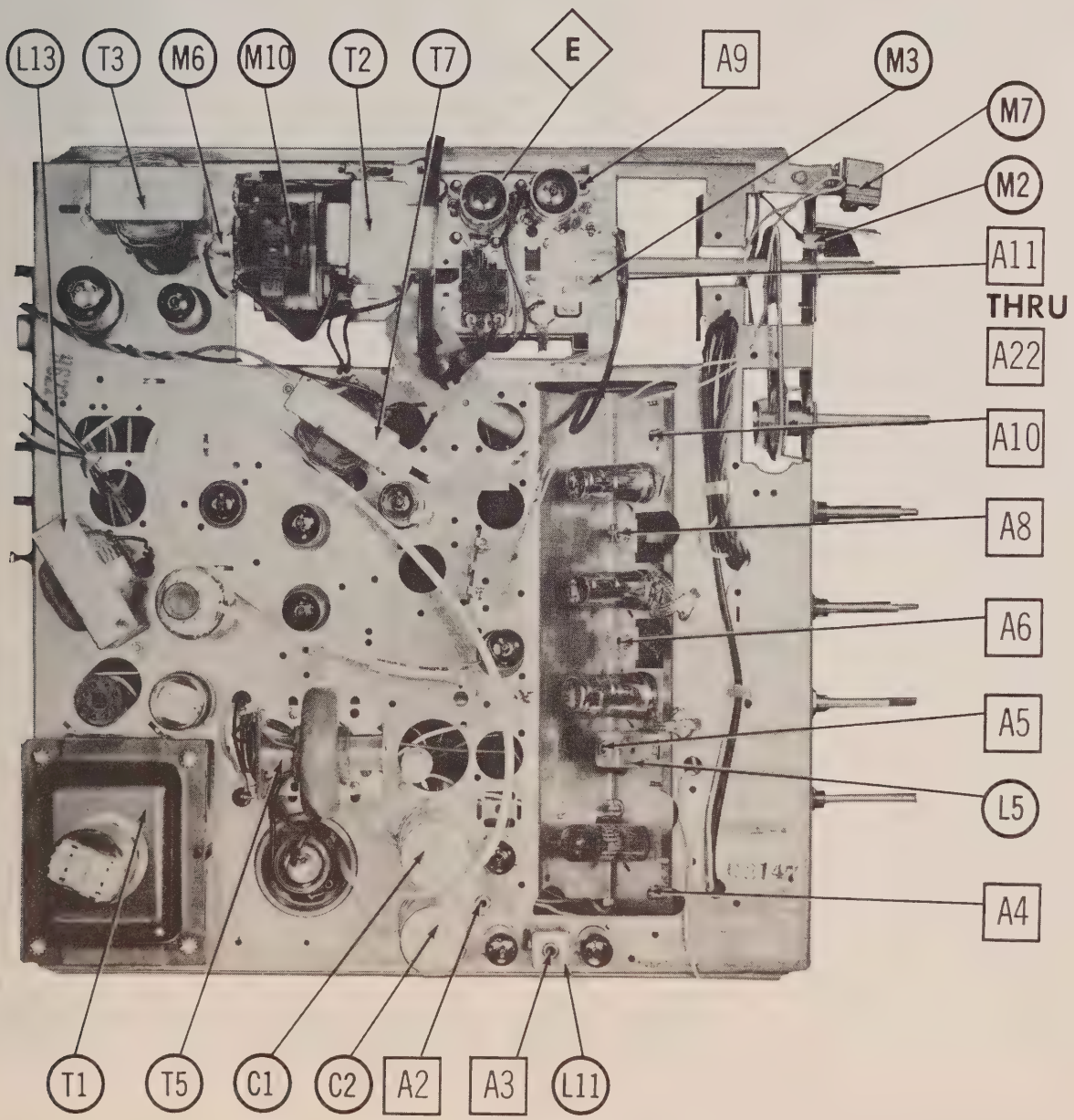
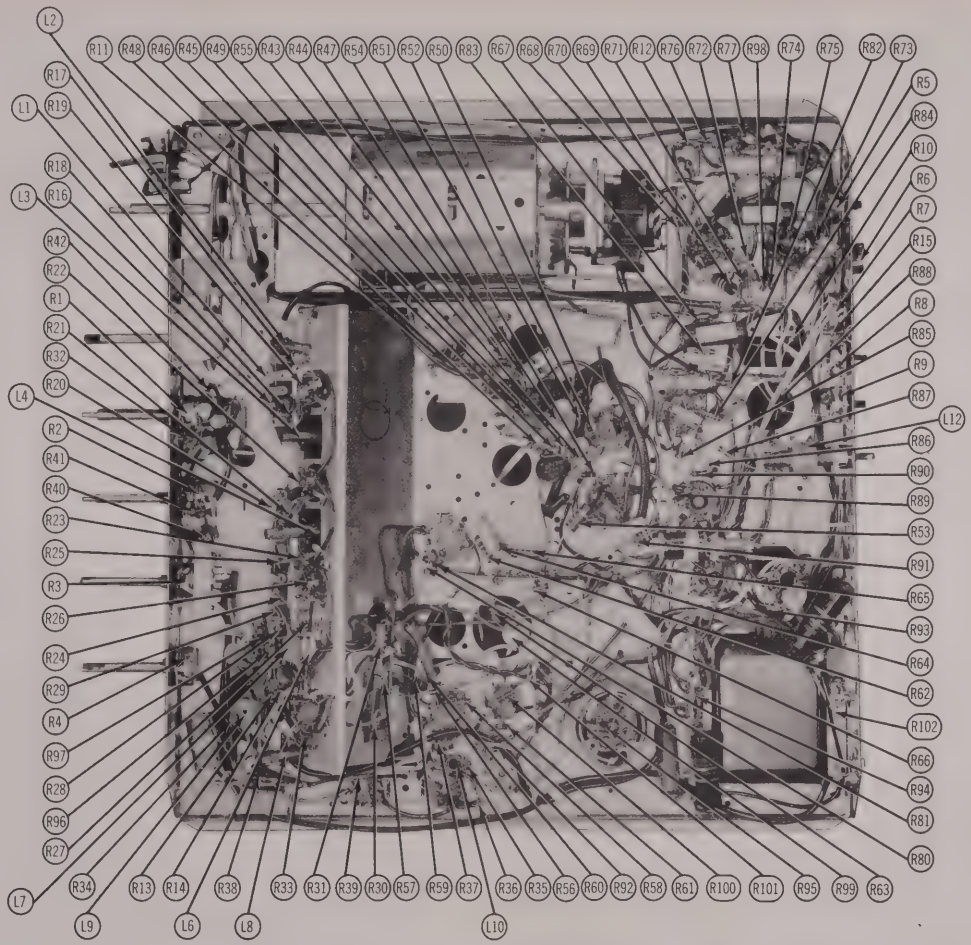


FIG. 3



CHASSIS TOP VIEW



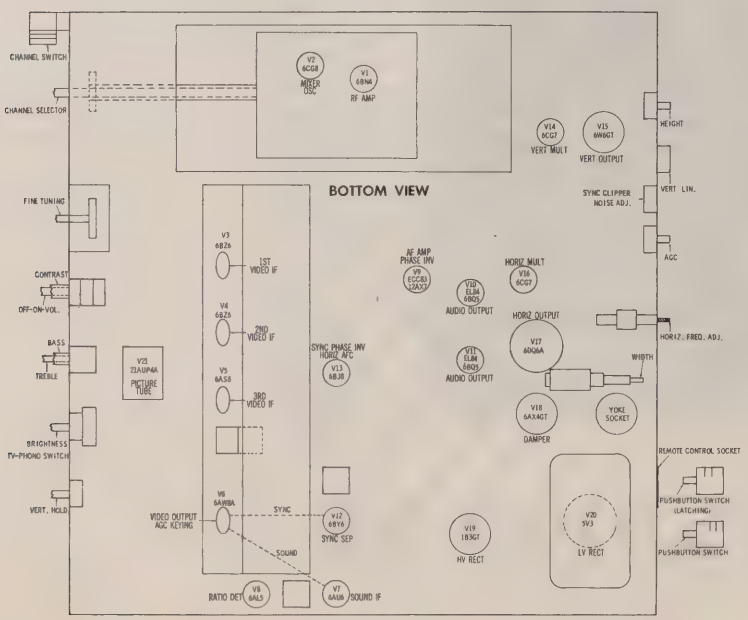
PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE St.
DENVER, COLORADO

CHASSIS BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION

RESISTANCE MEASUREMENTS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6BN4	0Ω	830K	0Ω	.1Ω	†4000Ω	0Ω	830K		
V2	6CG8	10K	†9800Ω	0Ω	0Ω	.1Ω	†4000Ω	†13K	0Ω	220K
V3	6BZ6	60K	47Ω	.1Ω	0Ω	†3500Ω	†3500Ω	0Ω		
V4	6BZ6	60K	47Ω	.1Ω	0Ω	†3500Ω	†3500Ω	0Ω		
V5	6AS8	†3500Ω	.1Ω	150Ω	.1Ω	0Ω	4700Ω	0Ω	.1Ω	†1000Ω
V6	6AW8A	†26Ω	†850Ω	440K	1Meg	1Meg	•230Ω	4700Ω	†18K	†4000Ω
V7	6AU6	47K	0Ω	0Ω	.1Ω	†18K	†18K	0Ω		
V8	6AL5	INF	INF	.1Ω	0Ω	0Ω	0Ω	10K		
V9	ECC83	†140K	2.3Meg	125K	0Ω	0Ω	†200K	4.8Meg	0Ω	.1Ω
V10	EL84	NC	270K	180Ω	0Ω	.1Ω	NC	†200Ω	NC	†26Ω
V11	EL84	NC	270K	180Ω	0Ω	.1Ω	NC	†200Ω	NC	†26Ω
V12	6BY6	•†2.7Meg	0Ω	0Ω	.1Ω	†470K	†22K	2.5Meg		
V13	6BJ8	15Ω	4.8Meg	15Ω	.1Ω	0Ω	4.8Meg	†4400Ω	†470K	4500Ω
V14	6CG7	†190K	4.7Meg	1000Ω	0Ω	.1Ω	†690K	•1.5Meg	1000Ω	0Ω
V15	6W6GT	TP	.1Ω	†475Ω	†575Ω	•1.2Meg	TP	0Ω	•1600Ω	
V16	6CG7	†7800Ω	5.2Meg	1500Ω	.1Ω	0Ω	†100K	100K	1500Ω	0Ω
V17	6DQ6A	NC	.1Ω	TP	†12K	1Meg	TP	0Ω	0Ω	TOP CAP ‡18Ω
V18	6AX4GT	NC	TP	INF	NC	†26Ω	NC	0Ω	.1Ω	
V19	1B3GT	PINS 1 THRU 8 HAVE INFINITE RESISTANCE								TOP CAP ‡348Ω
V20	5V3	NC	¶	NC	15Ω	NC	14Ω	NC	¶	
V21	21ACP4A	0Ω	22K	PIN 10 ‡10K	PIN 11 •300K	PIN 12 .1Ω				

† MEASURED FROM PIN 8 OF V20.
‡ MEASURED FROM PIN 3 OF V18.
• THIS READING WILL VARY. CONTROL SET FOR NORMAL OPERATION.
¶ THIS READING CAN VARY GREATLY, (10K MINIMUM), DUE TO THE CONDITION OF THE ELECTROLYTIC CAPACITOR CONNECTED IN THE ASSOCIATED CIRCUIT.
NC NO CONNECTION.
TP TIE POINT.



TUBE PLACEMENT CHART

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

ALTERNATE TUNER SCHEMATIC

A PHOTOFACT STANDARD NOTATION SCHEMATIC
Howard W. Sams & Co., Inc. 1957

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No	USE	TYPE	NOTES
V1	RF Amplifier	6BN4	
V2	Mixer-Oscillator	6CG8	
V3	1st Video IF Amp	6BZ6	
V4	2nd Video IF Amp	6BZ6	
V5	3rd Video IF Amp - Video Det	6AS8	
V6	Video Output-AGC-Keying	6AW8A	
V7	Sound IF Amp	6AU6	
V8	Ratio Det	6AL5	
V9	AF Amp -Phase Inv	ECC83	
V10	Audio Output	EL84	

ITEM No	USE	TYPE	NOTES
V11	Audio Output	EL84	
V12	Sync Phase Inv. - Horiz. AFC	6BJ8	
V13	Sync Phase Inv. - Vert. Output	6CG7	
V14	Vert. Mult.	6W6GT	
V15	Horiz. Mult.	6CG7	
V16	Horiz. Output	6DQ6A	
V17	Damper	6A4GT	
V19	HV Rectifier	1B3GT	
V20	LV Rectifier	5Y3	

PICTURE TUBE

ITEM No	REPLACEMENT DATA			NOTES
	HOFFMAN PART No	GENERAL ELECTRIC PART No	SYLVANIA PART No	
V21	21ACP4A	21ACP4A 21AMP4A 21BP4 ② 21ACP4 21AMP4	21ACP4A ①	① Silver screen 85% Aluminized
		21ACP4		
		21AMP4A ② 21AMP4		

ELECTROLYTIC CAPACITORS

ITEM No	RATING CAP	VOLT	REPLACEMENT DATA HOFFMAN PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	100	350	857104	AFH4-06-60	DO464		Q-025	R2340 *
B	40	350			FP433.3		MT-4540	
C	10	350			TC68			
D	10	350						
C2A	100	350	857103	AFH4-06-65	DO472.3		Q-231.5	TVL-4684
B	20	50			FP275.5			
C	30	50			BR506			
D	20	350			TC69			
C3	5	50	856006	PR850V5	BR85-50	TC30	TC-5-50	MT-1504 TVA-1303

* Non-catalog item

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No	RATING CAP	VOLT	REPLACEMENT DATA HOFFMAN PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C4	470		851122		DS-471	L10T47	ED-470		MS-347	10%
C5	470		851122		DS-471	L10T47	ED-470		MS-347	10%
C6	470		851122		DS-471	L10T47	ED-470		MS-347	10%
C7	1000		850206	BPD-001	DD-102	BYA81A	ED-1000	DC53L	S1K-DL	
C8	470		851122		DS-471	L10T47	ED-470		MS-347	10%
C9	470		851122		DS-471	L10T47	ED-470		MS-347	10%
C10	1000		850206	BPD-001	DD-102	BYA81A	ED-1000	DC53L	S1K-DL	
C11	1000		850206	BPD-001	DD-102	BYA81A	ED-1000	DC53L	S1K-DL	
C12	33			NPO-81 33	TCC-33	L10G33C	TCC-33	STCC-G33	STCC-G33	NPO 10%
C13	470		851122		DS-471	L10T47	ED-470		MS-347	10%
C14	470		851122		DS-471	L10T47	ED-470		MS-347	10%
C15	1000		850206	BPD-001	DD-102	BYA81A	ED-1000	DC53L	S1K-DL	
C16	1000		850206	BPD-001	DD-102	BYA81A	ED-1000	DC53L	S1K-DL	
C17	1000		850206	BPD-001	DD-102	BYA81A	ED-1000	DC53L	S1K-DL	
C18	10		854043	NPO-81 10	DS-100	L10G	ED-10	ET-541	STCC-Q1	10%
C19	4700		856359							10%
C20	470		851122		DS-471	L10T47	ED-470		MS-347	10%
C21	4700		856359			LR5D47			MS-347	10%
C22	47		854051	NPO-81 47	DD-470	L10Q47	ED-47	ET-5447	STCC-Q47	10%
C23	47000		866271							10%
C24	47	200	866171			LR5D47			MS-347	10%
C25	2.2		854035	NPO-81 2.2	TCZ-2R2	C10Y22C	TCC-2.2		STCCB-Y22	10%
C26	47		854051	NPO-81 47	DD-470	L10Q47	ED-47	ET-5447	STCC-Q47	10%
C27	47		854051	NPO-81 47	DD-470	L10Q47	ED-47	ET-5447	STCC-Q47	10%
C28	10000		856363							10%
C29	4700		856359			LR5D47			MS-347	10%
C30	047	200	866171							10%
C31	4700		856359			LR5D47			MS-347	10%
C32	470		851122		DD-471	L10T47	ED-470		MS-347	10%
C33	470		851122		DD-471	L10T47	ED-470		MS-347	10%
C34	220		850209		DD-221	L10T22	ED-220		MS-322	10%
C35	220		850209		DD-221	L10T22	ED-220		MS-322	10%
C36	2200		856355			LR5D22			MS-322	10%
C37	047	200	866171							10%
C38	100			BPD-0001	DD-101	L10T1	ED-100	UC-531	5GA-T1	10%
C39	820		851127			LR5T82	ED-820		MS-382	10%
C40	820		851127			LR5T82	ED-820		MS-382	10%
C41	1500		856353			LR5D15	ED-1500		MS-315	10%
C42	220		850209			L10T22	ED-220		MS-322	10%
C43	10000		856367							10%
C44	20000		856367							10%
C45	1500	1500	856115	HVD-15-1500	DD30-152	HVB30D15	HD15-1500	DC30215		
C46	1500	1500	856115	HVD-15-1500	DD30-152	HVB30D15	HD15-1500	DC30215		
C47	1.0	100	866186					GEM-31		10%
C48	22	200	866179					GEM-3022		10%
C49	4700		856359							10%
C50	47	200	866183					GEM-3047		10%
C51	10000		856363							10%
C52	47		854051	NPO-81 47	DD-470	L10Q47	ED-47	ET-5447	STCC-Q47	10%
C53	.0022	400	866255							10%
C54	220		850209		DD-221	L10T22	ED-220		MS-322	10%
C55	.1	600	866275					GEM-401		10%
C56	.0047	200	866159							10%
C57	.0047	200	866259							10%
C58	.047	200	866171							10%
C59	.1	600	866275					GEM-501		10%
C60	.1	300	866175					GEM-301		10%
C61	.1	400	866275					GEM-401		10%
C62	.001	400	866251							10%
C63	.001	400	866251							10%
C64	.0047	300	866159							10%
C65	.047	200	866171							10%
C66	100			1464-0001	DS-101	32S571	ED-100	MC358	MS-31	10%
C67	3800		866256	1464-0019		LR5D39			MS-339	10%
C68	470		851123	1464-00047	DS-471	LR5T47	ED-470		MS-347	10%

PARTS LIST AND DESCRIPTIONS

CAPACITORS (cont)

ITEM No	RATING CAP	VOLT	REPLACEMENT DATA HOFFMAN PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C69	330		850207	1469-00033	DS-331	DL-471	ED-330		MS-330	10%
C70	470		851123		DS-471		ED-470		MS-347	10%
C71	.001	600	866251							10%
C72	.1	600	866375					GEM-601		10%
C73	.047	800	866371							10%
C74	68	3000	850103							10%
C75	82	30%	850103							10%
C76	82	3000	850103							10%
C77	.1	600	866375					GEM-601		10%
C78	.1	600	866375					GEM-601		10%
C81	.1	600	866375					GEM-601		10%
C82	.1	600	866375					GEM-601		10%

CONTROLS

ITEM No	RATING RESISTANCE	WATTS	REPLACEMENT DATA HOFFMAN PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500Ω	½	803009	F1-1				Contrast
B	1Meg	½		R2-73				Volume - Tap ② 500K
C	Switch			KB-7				AC & Spot Eliminator
R2A	1Meg	½	803010	F1-51				Base
B	1Meg	½		R3-51				Treble
R3A	150K	½	800006					Brightness
B	Switch							TV-Stereo
R4A	1.25Meg	½	800007	R-742	A47-1.5Meg-G	QU-138	U158	Vert. Hold
B	Shaft			Not Reg.	FS-3	QU-135	Not Reg.	
R5A	5Meg	½	800013	R2-75	A47-2Meg-G	QU-135	TA35L	Height
B	Shaft			Not Reg.	FS3-1/4		Not Reg.	
R6	2000Ω	3	806001		59-2000		FL-3.5K	Vert. Linearity - Wire wound
R7A	4Meg	½	800015	A2-36	A47-4Meg-G			Sync Noise Clipper Adjustment
B	Shaft			AE-1	FS3-1/4			
R8A	2Meg	½	800011	A2-34	A47-2Meg-G			Note 1
B	Shaft			AE-1	FS3-1/4			
R9A	500K	½	800009	A2-35	A47-500K-G	QU-133	TA54L	Area
B	Shaft			Not Reg.	FS3-1/4	Not Reg.	Not Reg.	
R10A	10K	½	800008	A2-14	A47-10K-G	BU-131	TA44L	Horiz. Drive
B	Shaft			AE-1	FS3-1/4	TM1-K1	Not Reg.	

* Concentrikit Equivalent K-4 Kit, Base Elements & Shafts BU-137, P1-200 (Panel) BU-137, R1-212 (Rear)

Note 1 Alternate part number

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No	RATING OHMS	WATT	REPLACEMENT DATA HOFFMAN PART No.	IRC PART No.	NOTES
R10	470Ω		814158	BTS-470	
R11	100K		841216	BTS-100K	
R12	2.7Meg		814233	BTS-2.7Meg	
R13	470K		814234	BTS-470K	
R14	470K		814234	BTS-470K	
R15	15K		814206	BTS-15K	
R16	470Ω		814158	BTS-470	
R17	47K		814232		
R18	470Ω		814158	BTS-470	
R19	47Ω		814178	BTS-47	
R20	470Ω		814158	BTS-470	
R21	470Ω		814158	BTS-470	
R22	47Ω		814178	BTS-47	
R23	47K		814212		
R24	1000Ω		814191	BTS-1000	
R25	470Ω		814158	BTS-470	
R26	150Ω		814183	BTS-150	
R27	12K		814205	BTS-12K	
R28	4700Ω		814204	BTS-4700	
R29	47Ω		814213		
R30	22K		814208		
R31	18K	3	814207		
R32	390Ω		814187	BTS-390	
R33	330Ω	1	814186	BTA-330	
R34	3900Ω	4	814192		
R35	47K		814212	BTS-47K	
R36	8200Ω		814203	BTS-8200	
R37	15K	3	814206	BTS-15K	
R38	10K		814204	BTS-10K	
R39	180Ω		814183	BTS-180	
R40	330Ω		814222	BTS-330K	
R41	330K		814222	BTS-330K	
R42	68K		814214	BTS-68K	
R43	4.7Meg		814235	BTS-4.7Meg	
R44	100K		814216	BTS-100K	
R45	180K		814218	BTS-180K	
R46	2.2Meg		814232	BTS-2.2Meg	
R47	120K		814217	BTS-120K	
R48	4700Ω		814200	BTS-4700	
R49	130K		814217	BTS-120K	
R50	1000Ω		814192	BTS-1000	
R51	370K		814221	BTS-370K	
R52	22K		814208	BTS-22K	
R53	180Ω	3	814183	BTS-180	
R54	1000Ω		814192	BTS-1000	
R55	270K		814221	BTS-270K	
R56	330K		814222	BTS-330K	

ITEM No	RATING OHMS	WATT	REPLACEMENT DATA HOFFMAN PART No.	IRC PART No.	NOTES
R57	2.2Meg		814232	BTS-2.2Meg	
R58	470K	1	814234	BTS-470K	
R59	82000	1	816210	BTA-8200	
R60	22K	4	814508		
R61	150K		814218	BTS-150K	
R62	12000	1	816203	BTA-1200	
R63	2200Ω	5% 1	816075	BTA-2200 5%	
R64	2200Ω	1	815203	BTA-2200	
R65	1800Ω	5% 1	816089	BTA-1800 5%	
R66	470Ω		814158	BTS-470	
R67	22K		814208	BTS-22K	
R68	4.7Meg		814235	BTS-4.7Meg	
R69	180K	2	816219	BTS-180K	
R70	1000Ω	5%	816083	BTS-1000 5%	
R71	1.2Meg		814229	BTS-1.2Meg	
R72	880K	1	816233	BTA-880K	
R73	100Ω		814180	BTS-100	
R74	5600Ω		814201	BTS-5600	
R75	470Ω	1	816196	BTA-470	
R76	4.7Meg		814235	BTS-4.7Meg	
R77	22K		814208	BTS-22K	
R78	560Ω		814189	BTS-560	
R79	580Ω		814189	BTS-560	
R80	100K		814216		
R81	100K		814216		
R82	4.7Meg		814235		
R83	470K		814224		
R84	8000Ω		814202		
R85	1500Ω	5%	816087		
R86	100K		814216		
R87	100K		814216		
R88	4700Ω		814200		
R89	100Ω		814180		
R90	1Meg		814228		
R91	12K	2		BTS-1000	Note 1
R92	1000Ω		814192		
R93	4700Ω	1	816177	BTA-15	
R94	15Ω		815156		
R95	2.2Ω		814210		
R96	180K		814216	BTS-180K	
R97	100K		814216	BTS-100K	
R98	10K		814204	BTS-10K	
R99	3300Ω	10	815601	PW0-3300	
R100	1.5Meg		814231	BTS-1.5Meg	Note 2
R101	2.2Meg		814232	BTS-2.2Meg	
R102	330K		814223	BTS-330K	

Note 1. Some versions may use an 820Ω in this application.
Note 2. Some versions may use a 1Meg in this application.

TRANSFORMER (POWER)

ITEM No	RATING PRI.	SEC. 1	SEC. 2	SEC. 3	REPLACEMENT DATA HOFFMAN PART No.	Halldorson PART No	Merit PART No	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC	540VCT	5V	6.3V	716003					
	① 1.8A	② .300A	③ 3.8A	② 10A, SEC. 4 6.3V 2 .8A						

TRANSFORMER (MISC)

ITEM No	RATING PRI.	SEC. 1	SEC. 2	SEC. 3	REPLACEMENT DATA HOFFMAN PART No	Halldorson PART No	Merit PART No	Stancor PART No	Thordarson PART No	Triad PART No
T2	117VAC	27V			722001					
	2A	2.8A								

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	REPLACEMENT DATA HOFFMAN PART No	Halldorson PART No	Merit PART No	RCA TYPE No	Ram PART No	Stancor PART No	Thordarson PART No	Triad PART No
T3	Vert Output	726002	21W90 ①	A-2823		V307	A-8142 ②	26877	H-108X
T4A	Yoke-Horiz. (20MH)	790002	DF807	MDF-92	33SDI	V90F18/43	DY-18A	Y-18	Y-40 &
B	(90°) Vert. (36.5MH)		③ ⑤	③ ⑤	③ ⑤	③ ⑤	⑤	③ ⑤	NWA ② ⑤
T5	Horiz. Output	782002	FB40 *	HVO-36 *	23ST1 *	X094 *	HO-256 *	FLY-18 *	D-95 *
T9	Width Coil (3.7-17MH)	778002	RF800	MWC-11	23JN1	XOJN8	WC-3	WC-18	WLC-6
			⑤ ⑦				⑤	⑤	

① Use 8 to 1 turn ratio.
② Drill new mounting hole(s).
③ Connect horizontal network across terminals #3 and #7.
⑤ Use original horizontal network, if necessary.
⑦ Use original rear cover, focus and centering device.
* Enlarge mounting hole
† Use terminals #1 and #2.
‡ Use red and blue terminals

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

Connect Width Coil Across ⟶	ORIGINAL FLEMIRAM CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
	8	9	9	9	9	9	9	5
	7	7	7	7	7	7	7	4
	6	5	5	5	5	5	5	3
	3	3	3	3	3	3	3	2
	2	1	1	1	1	1	1	1
	2 & 3	1 & 3	1 & 3	1 & 3	1 & 3	1 & 3	1 & 3	1 & 2

TRANSFORMER (AUDIO OUTPUT)

ITEM No	IMPEDANCE PRI.	SEC.	REPLACEMENT DATA HOFFMAN PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T7	7000	8-8Ω	T24008	E1113	A-2904 ①	A-3870	23S68	S-58X	① Drill one new mounting hole.
	CT								

SPEAKER

ITEM No	TYPE SIZE	FIELD	V. C. IMP.	REPLACEMENT DATA HOFFMAN PART No.	QUAM PART No.	NOTES
SP1	6"	PM	3-4Ω	708601 ①	8A31 ①	① Connect in series and phase.
SP2	8"	PM	3-4Ω	708601 ①	8A31 ①	
SP3	4"	PM	8-8Ω	708002	4A12S	

COILS (RF-IF)

ITEM No	USE	REPLACEMENT DATA HOFFMAN PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	RF Choke	750004				27 Microhenries
L2	1st. Video IF	762006	17-4534	TV-131	6126	
L3	2nd. Video IF	762009	17-4533	TV-130	6124	
L4	3rd. Video IF	762007	17-4526		6123	Includes 47.25MC Trap
L5	4th. Video IF	762004	17-4006	TV-126	6124	
L6	Series Peaking Coil	771008	19-5100	TV-181	6177	100 Microhenries
L7	Shunt Peaking Coil	771019		TV-307	6156	830 Microhenries
L8	4.5MC Trap	762008	30-1004	TV-181	1468 *	
L9	Series Peaking Coil	771030	19-3250	TV-185	6181	350 Microhenries
L10	Sound IF	762005	30-4004	TV-181	1468 *	
L11	Ratio Detector	774002	17-3497	TV-115	6306	

* Disregard tap.

TRANSFORMER (HORIZ. OSC.)

ITEM No	DC RES PRI.	SEC.	REPLACEMENT DATA HOFFMAN PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	RCA TYPE No	Ram PART No	Thordarson PART No.	NOTES
L12	90Ω		768004	19-1578	TV-163	6210		S-103	18S-5	

FILTER CHOKE

ITEM No	RATINGS TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE @ CURRENT 1000 "Cs"	REPLACEMENT DATA HOFFMAN PART No	MILLER PART No	Halldorson PART No	Merit PART No	Stancor PART No	Thordarson PART No	Triad PART No
L13	240A	26Ω	1.4 HY.	T24009	C5037	C-3896	C-2328 ①	26C95	C-17X	

① Drill one new mounting hole.

COMPONENT COMBINATIONS

ITEM No	USE	DESCRIPTION	HOFFMAN PART No.	REPLACEMENT DATA	
X1	Vert. Integrator	2200MMF, 4700MMF, 4700MMF, 22K, 82000, 820Ω	968001	Aerovox Centralab Cornell-Dubilier Erie Sprague	PA-110 PC-100 LHT-M 1405-01 V-1

HOFFMAN MODELS M3281, U, P3281, U, B3291, U (Ch. 421, U)

FOLDER 3

PARTS LIST AND DESCRIPTIONS (Continued)

RECTIFIERS

ITEM No.	RATING	REPLACEMENT DATA					NOTES
	CURRENT (Measured)	HOFFMAN PART No.	FEDERAL PART No.	GENERAL ELECTRIC PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	
M1		744003	1215		1T1		

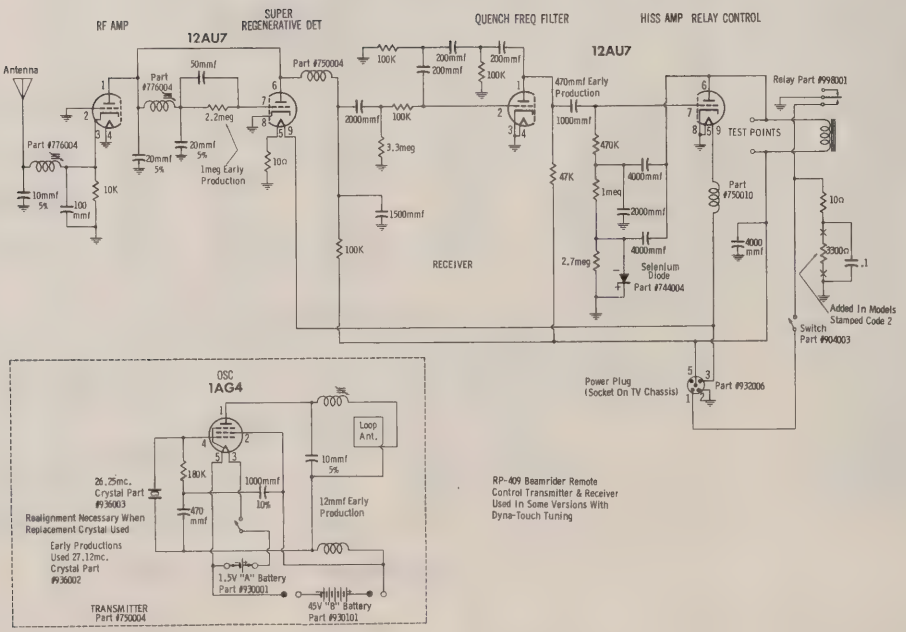
MISCELLANEOUS

ITEM No.	PART NAME	HOFFMAN PART No.	NOTES
M2	Pilot Light	940151	Type #51
M3	Tuner	710001	VHF
	Tuner	712002	UHF/VHF
M4	Switch	900002	Pushbutton (latching) VHF Models
M5	Switch	900001	Pushbutton - VHF Models
M6	Switch		Picture blanking - VHF Models
M7	Switch		Cycle Stop - VHF Models
M8	Focus Magnet	968001	Includes centering device and yoke cover
M9	Ion Trap	970001	
M10	Motor	715001	24 Volt Motor Assy.

CABINETS & CABINET PARTS

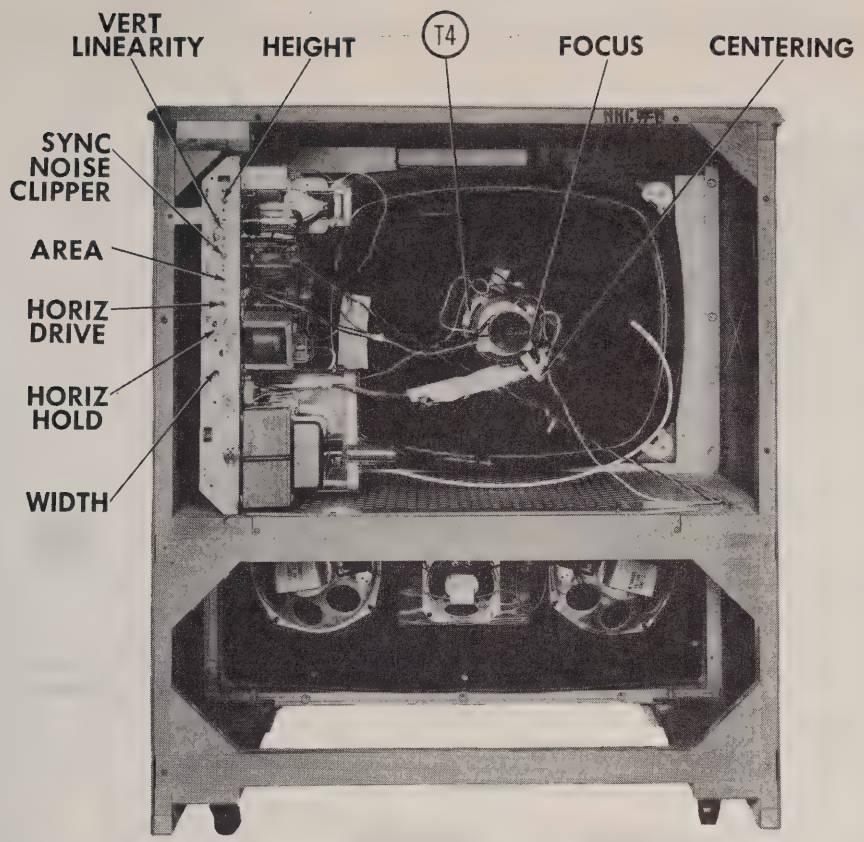
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Safety Glass	428004	
Mask	402001	
Escutcheon	452004	VHF Models
Escutcheon	452007	UHF/VHF Models
Knob	506004	Pushbutton Channel Selector - VHF Models
Knob	480020	UHF 1st. Section
Knob	480013	UHF 2nd. Section
Knob	500005	VHF Fine Tuning
Knob	480027	UHF Fine Tuning
Knob	500004	Volume
Knob	512004	Bass & Vert. Hold
Knob	508007	Brightness & Contrast
Cabinet	352010	Mahogany - Models M328l, U
Cabinet	352012	Provincial - Models P328l, U
Cabinet	352011	Oak - Models B329l, U



A PHOTOFACT STANDARD NOTATION SCHEMATIC
Howard W. Sams & Co., Inc. 1957

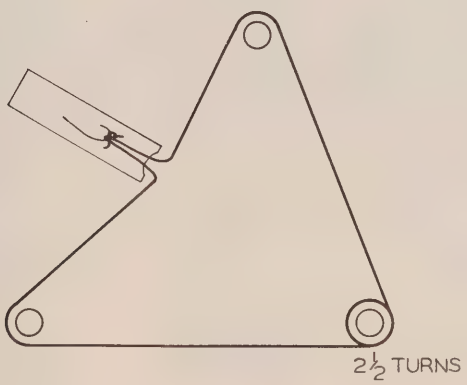
REMOTE CONTROL



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

1. Turn the set on and tune in a TV station, preferably with a test pattern.
2. Set the brightness and contrast controls for a normal picture.
3. Turn the horizontal hold clockwise until the picture loses sync. It may be necessary to switch off channel and back again for picture to lose sync.
4. Turn the horizontal hold slowly counter clockwise until the picture just falls into sync.
5. Turn to an unused channel. If vertical lines appear near the center of the screen, slowly adjust the horizontal drive control (R9) until white lines disappear.
6. If in step 5 the horizontal drive was adjusted, tune in a TV station and repeat steps 3 and 4. Check horizontal sync by switching off channel and back again.
7. Adjust width slug (B1) for a picture slightly wider than necessary to fill the picture mask horizontally.



FINE TUNING DRIVE CORD STRINGING

PHOTOFACT* Folder

*TRADE MARK

RETMA MEMBER

RAYTHEON MODELS C-21C1-B, -M, M-21CO-B, -M (Ch. 21CT1C)

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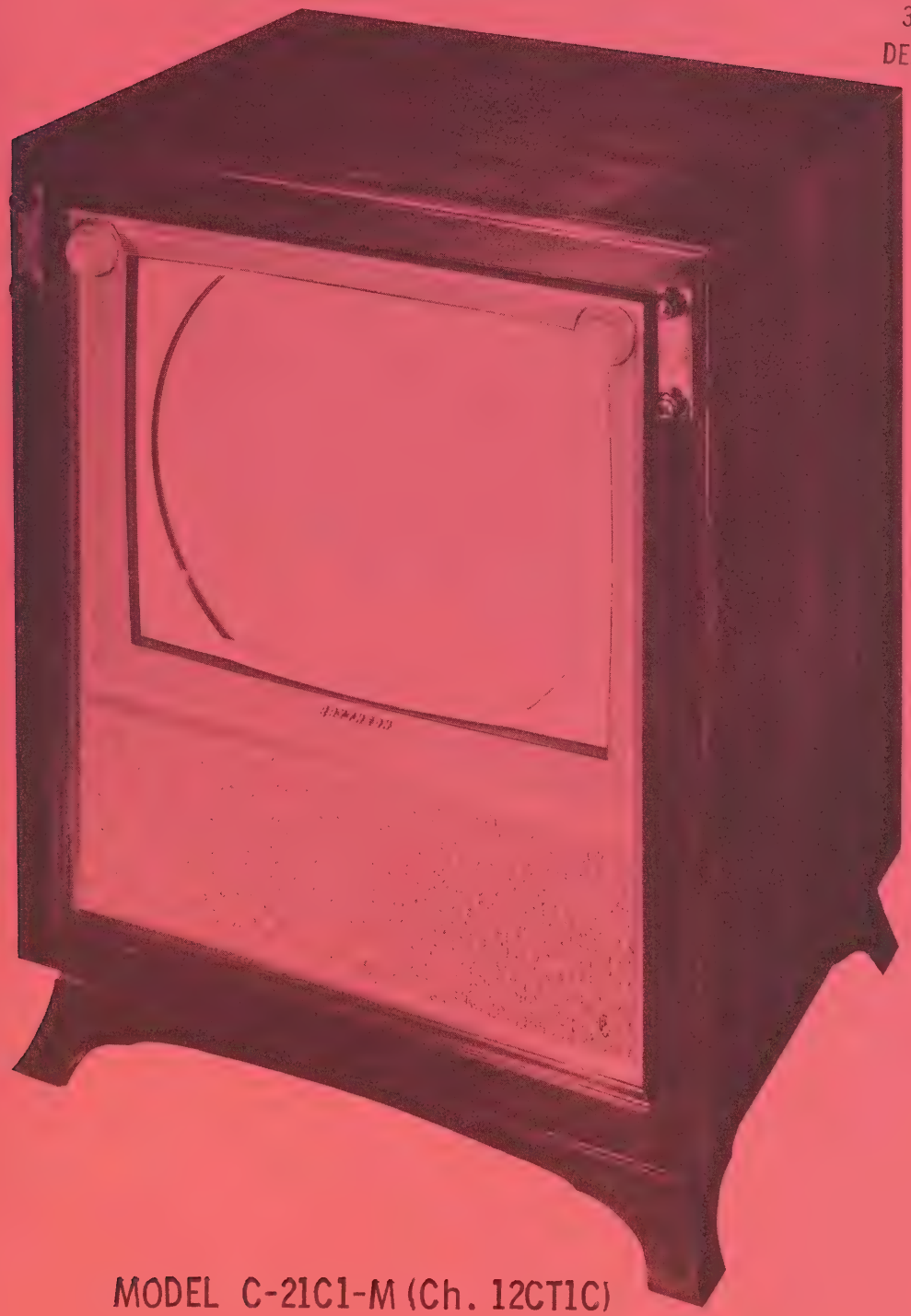

MODEL C-21C1-M (Ch. 12CT1C)

RAYTHEON MODELS C-21C1-B, -M, M-21CO-B, -M (Ch. 21CT1C)

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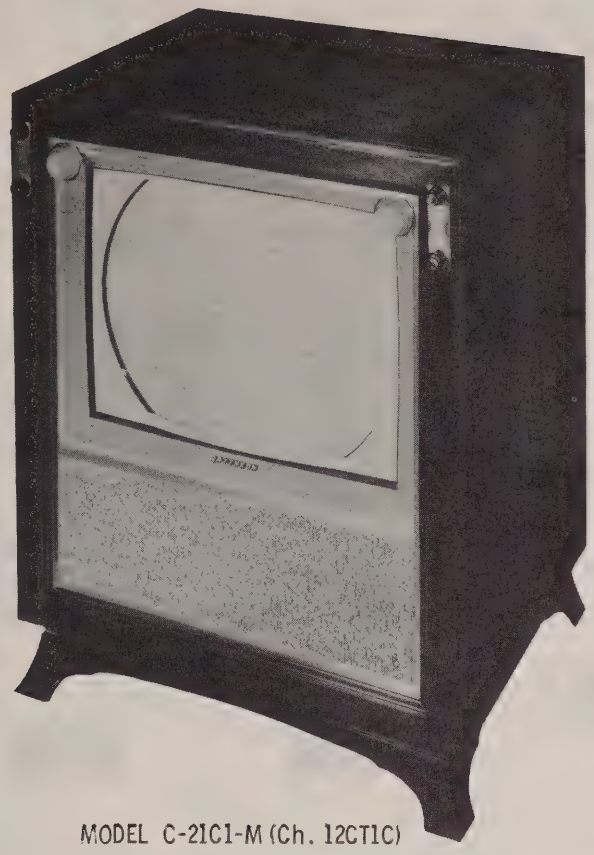
PHOTOFACT* Folder

*TRADE MARK

RAYTHEON MODELS C-21C1-B, -M, M-21C0-B, -M (Ch. 21CT1C)



MODEL C-21C1-M (Ch. 12CT1C)

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RAYTHEON MODELS C-21C1-B, -M, M-21C0-B, -M (Ch. 21CT1C)

TRADE NAME	Raytheon	MODELS	CHASSIS
		C-21C1-B, C-21C1-M, M-21C0-B, M-21C0-M	21CT1C
MANUFACTURER	Raytheon Manufacturing Co., 5921 W. Dickens Ave., Chicago 39, Illinois		
TYPE SET	Color Television Receiver		
TUBES	Twenty-seven		
POWER SUPPLY	110-120 Volts AC, 60 Cycle	RATING 350 Watts, 4 Amp. @ 117 Volts AC	
TUNING RANGE	Channels 2 thru 13 VHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)		

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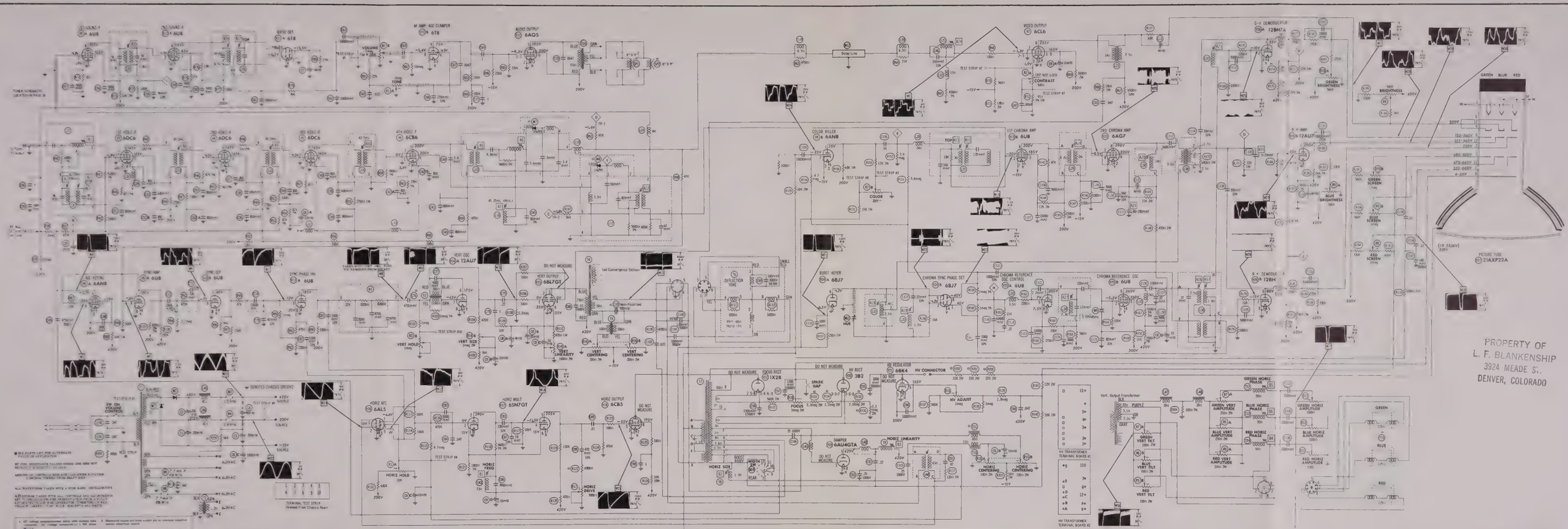
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RAYTHEON MODELS C-21C1-B, -M, M-21CO-B, -M (Ch. 21CTIC)

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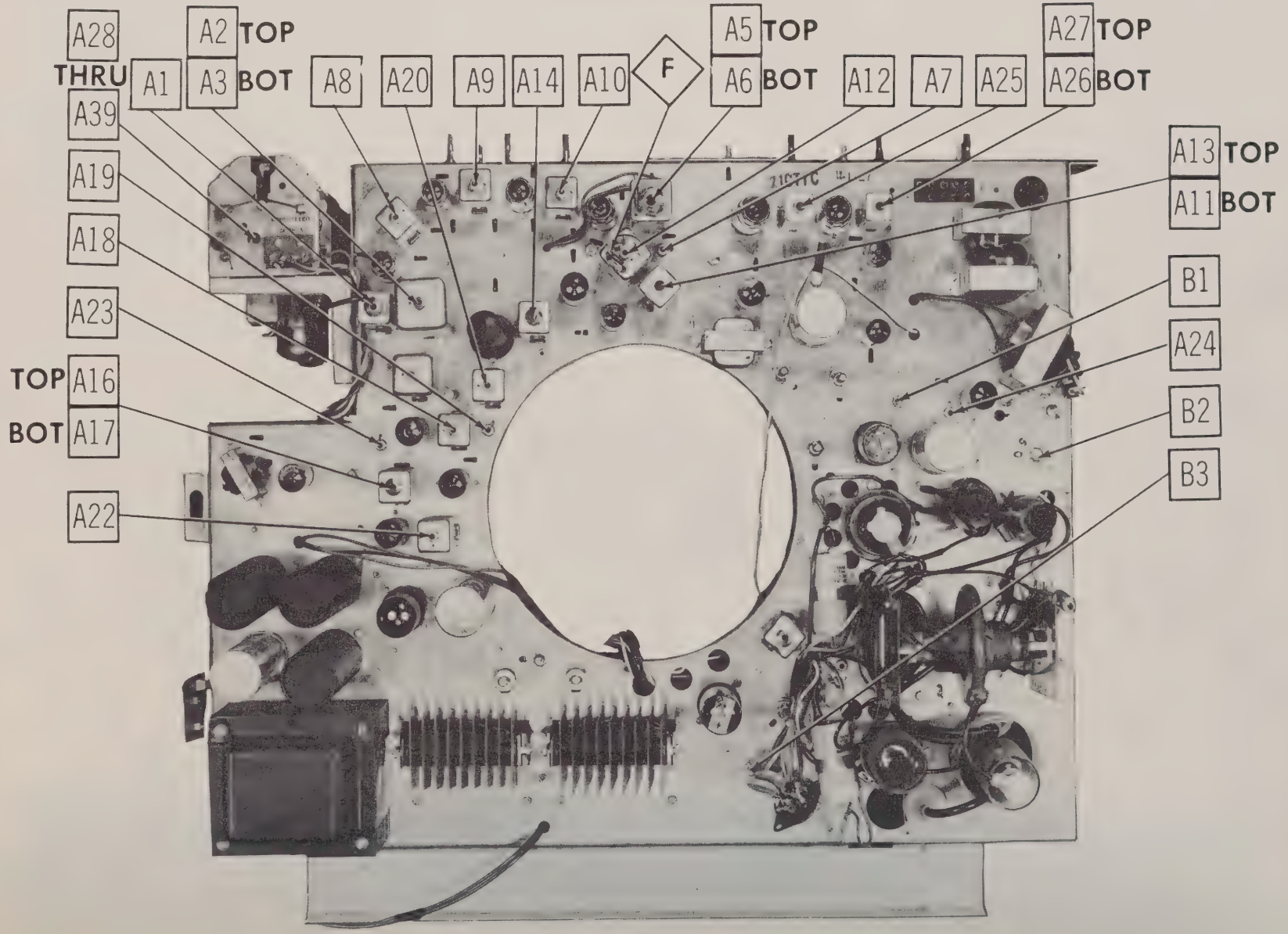
BLOCK DIAGRAM

FOLDER 4



CHASSIS TOP VIEW ALIGNMENT IDENTIFICATION

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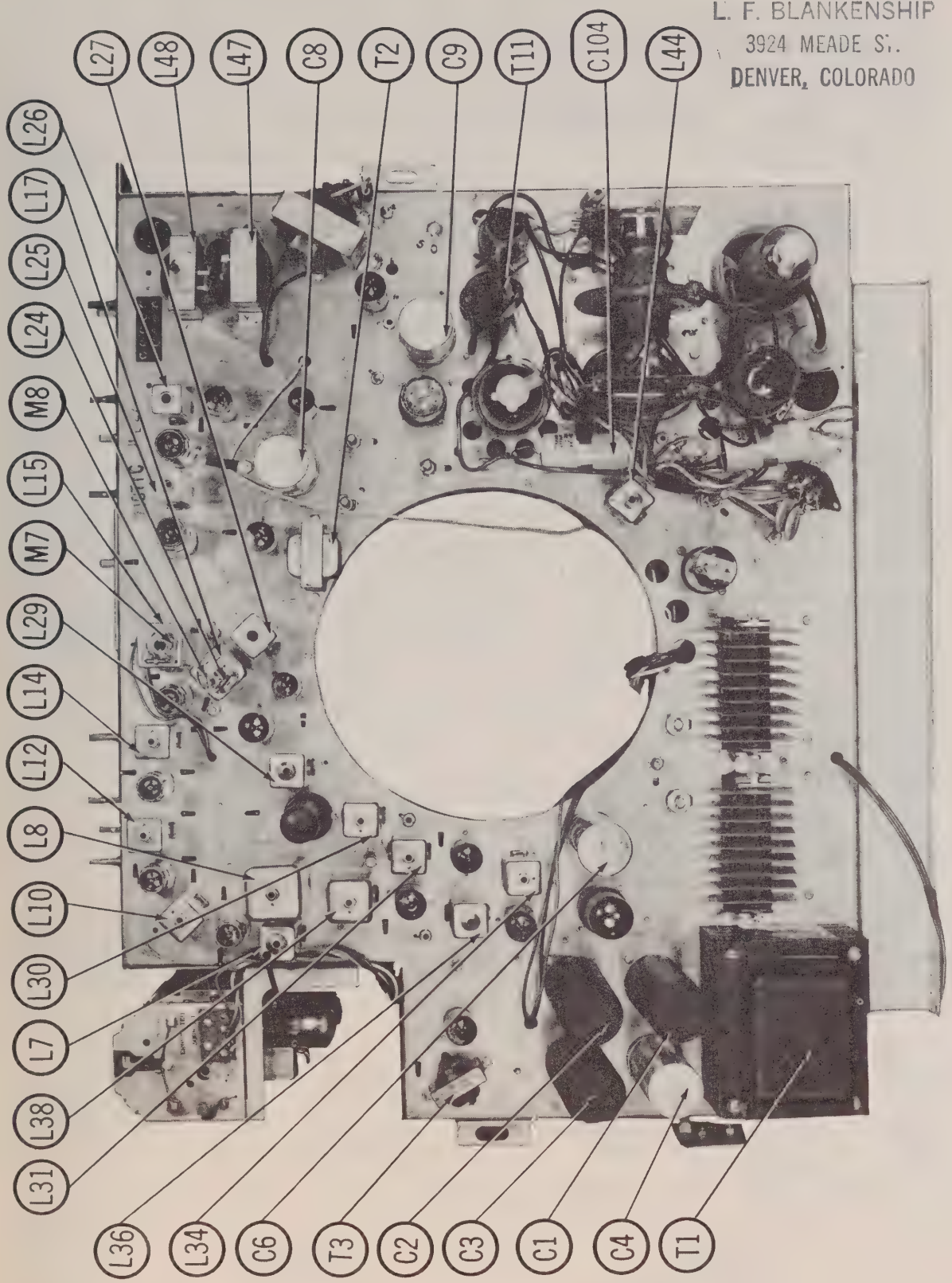


CHASSIS TOP VIEW

RAYTHEON MODELS C-21C1-B, -M,
M-21CO-B, -M (Ch. 21CT1C)

ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

To eliminate interference to the response curves during alignment, disable the high voltage circuit by removing the damper tube (V19).
Allow a 20 minute warm-up period for the receiver and test equipment.

VIDEO IF ALIGNMENT

Connect the negative lead of a 4.5 volt bias supply to point Ⓐ . Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Direct	High side to point Ⓑ (thru hole in top of tuner). Low side to chassis.	44.5MC	41.25MC	10	Vert. Amp. thru detector probe to pin 5 (plate) of 6DC6 (V3). Low side to chassis.	A1, A2, A3, A4	Adjust for maximum gain and symmetry of response similar to Fig. 1 with markers as shown. Correct settings for A2 and A3 are with slugs farthest clockwise when adjusting both from top.
2.	1500MMF	High side to pin 1 (grid) of 6CB6 (V6). Low side to chassis.	"	41.7MC 42.17MC 42.7MC 45.75MC	"	Vert. Amp. thru 10K to point Ⓒ . Low side to chassis.	A5, A6, A7	Adjust for maximum gain and symmetry of response similar to Fig. 2 with markers as shown. Start adjustment with slugs A5 and A6 at the outer most ends of coil forms and A7 nearest chassis.
3.	"	"	"	41.25MC 42.7MC 45.75MC	"	Vert. Amp. thru 10K to point Ⓓ . Low side to chassis.		Check for response curve similar to Fig. 3. If necessary, retouch A5, A6 and A7 for desired response. Repeat steps 2 and 3 until best curves are obtained similar to Fig. 2 and Fig. 3. Repeat step 1.
4.	"	High side to point Ⓑ . Low side to chassis.	Not used	45.0MC (Unmod)	"	USE VTVM. DC probe thru 10K to point Ⓓ . Low side to chassis.	A8	Adjust for maximum deflection.
5.	"	"	"	41.5MC	"	"	A9	"
6.	"	"	"	43.5MC	"	"	A10	"
7.	"	"	"	41.25MC	"	"	A2, A7	Adjust for MINIMUM deflection.
8.	"	"	"	47.25MC	"	"	A3	"
9.	"	"	44MC	42.17MC 42.7MC 44.75MC 45.75MC	"	Vert. Amp. thru 10K to point Ⓓ . Low side to chassis.		Check for response curve similar to Fig. 4. Check next step.
10.	"	"	"	41.25MC 42.7MC 42.17MC 42.7MC 44.75MC 45.75MC	"	Vert. Amp. thru 10K to point Ⓒ . Low side to chassis.		Check for response curve similar to Fig. 5. If necessary, retouch A7, A8 and A9 while switching scope connection between point Ⓒ and point Ⓓ until desired response is obtained in both positions.

CHROMA BANDPASS ALIGNMENT

Turn the brightness control fully counter clockwise.
Remove the chroma reference tube (V25) from its socket.
Disconnect one end of the chroma detector crystal (M8).
Connect the negative lead of a 16 volt bias supply to point Ⓔ . Positive to chassis.
Connect a 1MMF capacitor in series with the detector probe in the following steps.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
11.	3300Ω Carbon Resistor	High side to point Ⓕ . Low side to chassis.	Not used	4.5MC (400∿ 30% AM Mod)	Any non-interfering channel	Vert. Amp. thru a detector probe to point Ⓖ . Low side to chassis.	A11, A12	Adjust for MINIMUM deflection.
12.	"	"	"	4.1MC	"	"	A13	Adjust for maximum deflection.
13.	"	"	"	3.1MC	"	"	A14	"
14.	"	"	3.58MC (2MC Swp)	3.1MC 4.1MC 4.5MC	"	"	A15	Adjust for symmetrical response similar to Fig. 6 with markers as indicated.

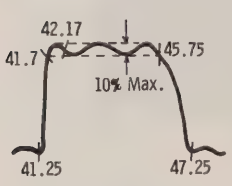


FIG. 1

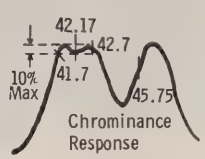


FIG. 2

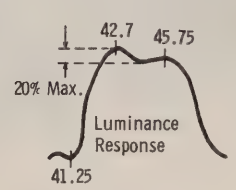


FIG. 3

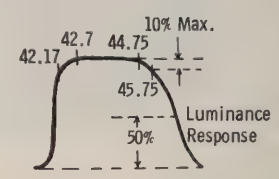


FIG. 4

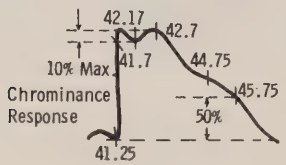


FIG. 5

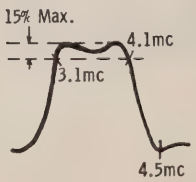


FIG. 6

ALIGNMENT INSTRUCTIONS (cont)

CHROMA REFERENCE OSCILLATOR ALIGNMENT

1. Set the color control to the center of its range.
2. Set the vertical and horizontal hold controls for correct frequency.
3. Turn brightness and contrast controls fully counter clockwise.
4. Remove the 1st. chroma amplifier tube (V13) from its socket.
5. Connect the DC probe of a VTVM to pin 7 (grid) of the 12BH7 (V26). Connect common to chassis. Set the VTVM to -30 volt scale.
6. Adjust A16 and A17 for maximum deflection.
7. Remove the VTVM connection and connect the vertical amplifier lead of a wide band scope thru a low capacity probe to pin 6 (plate) of the 6BJ7 (V24). Low side to chassis.
8. Adjust the "Hue" and A18 for maximum apparent burst on the scope.
9. Adjust A19, A20 and A21 for MINIMUM apparent burst on the scope.
10. Replace the 1st. chroma amplifier tube (V13) and reconnect the chroma detector crystal (M8).
11. Connect a color bar generator to the antenna terminals and adjust the fine tuning for the proper picture.
12. Remove the scope and connect the DC probe of the VTVM to point (E). Common to chassis.
13. Set the "Hue" to 50% mesh.
14. Adjust A18 for maximum negative voltage on the VTVM.
15. Move the DC probe of the VTVM from point (E) to point (H).
16. Adjust A22 for zero voltage.
17. Remove the VTVM connection and connect the vertical amplifier of the scope to point (J). Low side to chassis.
18. Adjust A18 for correct R-Y response for the color bar generator being used. (See Fig. 7).
19. Move scope connection to point (K).
20. Adjust A23 for correct G-Y response for the color bar generator being used.

3.58 MC TRAP ADJUSTMENT

1. Connect a color bar generator to the antenna terminals and adjust the fine tuning for the proper picture.
2. Connect the vertical amplifier lead of a wide band scope thru a low capacity probe to pin 6 (plate) of the 6CL6 (video output, V7). Low side to chassis.
3. Adjust A24 for MINIMUM sub-carrier response.

SOUND IF ALIGNMENT

Tune in a monochrome signal and adjust the fine tuning for best picture.
Connect the DC probe of a VTVM to point (L). Common to chassis.
Adjust A25 for maximum deflection.
Move the DC probe from point (L) to pin 2 (plate) of the 6T8 (V11).
Adjust A26 and A27 for maximum deflection. A27 will be found to have a broad peak, so adjust very carefully to highest peak.

TUNER OSCILLATOR ALIGNMENT

Connect bias as under "Video IF Alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning to the center of its range.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
15.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC	211.25MC 215.75MC	13	Vert. Amp. thru 47K to point (D). Low side to chassis.	A28	Adjust to place sound marker in trap notch as in Fig. 8. Video marker should fall at 50%.
			207MC	205.25MC 209.75MC	12		A29	
			201MC	199.25MC 203.75MC	11		A30	
			195MC	193.25MC 197.75MC	10		A31	
			189MC	187.25MC 191.75MC	9		A32	
			183MC	181.25MC 185.75MC	8		A33	
			177MC	175.25MC 179.75MC	7		A34	
			85MC	83.25MC 87.75MC	6		A35	
			79MC	77.25MC 81.75MC	5		A36	
			69MC	67.25MC 71.75MC	4		A37	
			63MC	61.25MC 65.75MC	3		A38	
			57MC	55.25MC 59.75MC	2		A39	

RF AND MIXER ALIGNMENT

This portion of the receiver has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.

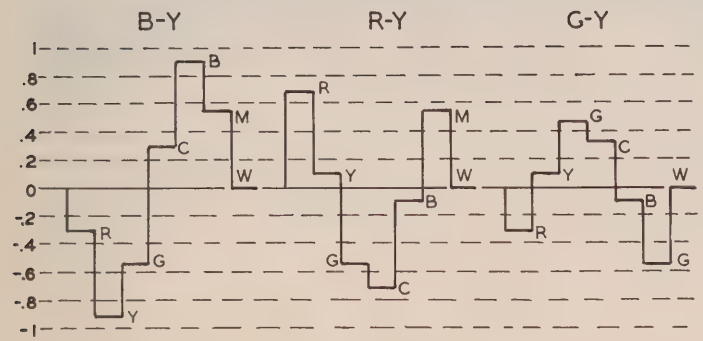


FIG. 7

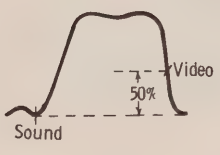


FIG. 8

MISCELLANEOUS ADJUSTMENTS

HORIZONTAL SWEEP CIRCUIT ADJUSTMENT

Turn the set on and tune in a monochrome signal. Adjust front controls for a normal picture. Set the horizontal hold control to the center of its range. Adjust the horizontal frequency slug (B1) until the picture synchronizes horizontally. Set B1 to the center of the range in which the picture remains in sync.

Adjust horizontal size switch and horizontal size plug (B2) for a picture SLIGHTLY wider than necessary to fill the picture mask horizontally. Connect the DC probe of a VTVM to pin 8 (grid) of 6CB5 (V18). Connect common to chassis. Adjust horizontal linearity slug (B3) for MINIMUM voltage. Rotate the horizontal drive control (R17) until drive lines (white vertical line or lines) disappear.

Turn the brightness control down until the picture is just visible. Connect the high voltage probe to the plate cap of the high voltage regulator tube (V21) and adjust the high voltage adj. control (R19) for 25 KV.

PRELIMINARY ADJUSTMENTS

Check adjustment of horizontal and vertical centering, focus, vertical linearity and vertical size controls.

Check position and location of the blue beam positioning magnet. (The magnet should be directly centered on the flags of the blue gun of the picture tube).

Check position and location of the purity magnet. (The purity magnet should be centered directly over the break in the gun structure, which is located SLIGHTLY forward of the blue beam positioning magnet).

Check the position and location of the convergence yoke assembly. (The assembly should be located approximately 1/4" back from the deflection yoke, and positioned so that the blue convergence coil is directly over the blue gun. (This coil may be identified by means of a colored lead.)

INITIAL CONVERGENCE ADJUSTMENT

Convergence must be set in the center area of the picture tube before attempting purity adjustments.

Adjust the brightness, blue and green brightness, and red, blue and green screen controls to produce an apparent black and white picture. If necessary, readjust the focus control.

Set the red, blue and green horizontal and vertical convergence amplitude controls fully counter clockwise. Set red, blue and green vertical convergence tilt controls to the center of their range.

Connect a dot generator to the antenna terminals and tune them in on the receiver. Check the contrast control setting.

Adjust the red, blue and green convergence magnets (part of the convergence yoke assembly) and the blue beam positioning magnet to produce good convergence in the center of the screen.

Remove the dot generator.

PURITY ADJUSTMENTS

1. Turn the brightness and contrast controls fully counter clockwise.
2. Turn blue and green brightness controls and blue and green screen controls fully counter clockwise.
3. Turn the channel selector to an unused channel.
4. Advance the red screen control fully clockwise.
5. Turn the brightness control slowly clockwise until a raster appears.
6. Pull all field equalizing magnets (edge magnets) to their maximum outward position. (There are three magnets on each side of the picture tube.
7. Adjust the purity magnets for MINIMUM effect which is when the two red tabs are together.
8. Adjust the purity magnet for best red field by rotating either or both tabs around the neck of the picture tube.
9. Loosen yoke positioning bolts and move the yoke backward and forward until the position is found that produces the maximum red over the entire face of the picture tube.

NOTE: It may be necessary to repeat steps 8 and 9 until optimum results are obtained.

10. Check for pure blue field by turning the red screen control fully counter clockwise and advancing the blue screen and blue brightness controls fully clockwise. Readjust the brightness control for a sufficient blue raster.
11. Check for a pure green field by turning the blue screen and the blue brightness controls fully counter clockwise and advancing the green screen and the green brightness controls fully clockwise. Readjust the brightness control for sufficient green raster.

NOTE: It may be necessary to repeat steps 8 and 9 while compromising on purity of red, blue and green raster so that a good average will be obtained on all fields. Good judgement will be matter of experience when purity is concerned. Any correction on one field effects the other two, therefore, each field must be check if either the yoke or the purity magnets are changed.

12. Adjust the red, blue and green screen and blue and green brightness controls to produce a white raster with a low brightness level. If color contamination is visible at the edge of the screen, adjust the field equalizing magnets nearest the area of contamination to produce the most uniform white field over the entire screen.

VERTICAL CONVERGENCE

Connect a dot generator to the antenna terminals and tune in the dot pattern on the receiver. Set the brightness and contrast controls for a suitable dot pattern.

Adjust the red, blue and green convergence magnets and the blue beam positioning magnet to provide good convergence in the center of the screen.

As an aid to performing the vertical convergence adjustments, it is advisable to block off all but one center vertical row of dots with cardboard or some other material.

Turn the blue brightness and blue screen controls fully counter clockwise.

Adjust the red screen, green screen and green brightness controls for equal size red and green dots.

Adjust the green and red vertical amplitude and tilt controls until the red and green dots are equally spaced from each other in the same direction.

Adjust the red and green convergence magnets to overlap the red and green dots to obtain yellow dots.

If necessary, readjust the red and green vertical amplitude and tilt controls until the dots overlap evenly from one end of the vertical center row to the other, thereby producing a vertical row of yellow dots.

Turn the green screen and green brightness controls fully counter clockwise.

Advance the blue screen and blue brightness controls until blue dots appear equal in size to the red dots.

Adjust the blue vertical amplitude and tilt controls until the blue dots are equally spaced in the same direction from the red dots.

Adjust the blue convergence magnet and the blue beam positioning magnet until the blue dots overlap the red dots, thereby producing magenta dots.

Readjust the blue vertical amplitude and tilt controls until all the dots in the center vertical row are magenta and no evidence of red or blue is visible.

Turn the red screen control fully counter clockwise. Advance the green screen and green brightness controls until the green dots are the same size as the blue dots.

Adjust the green vertical amplitude and tilt controls until green dots overlap the blue dots, thereby producing cyan dots. If necessary, readjust the green convergence magnet.

Advance the red screen control until white dots are observed.

Readjust the red, blue and green vertical amplitude and tilt controls as well as the red, blue and green convergence magnets, if necessary, until only white dots appear and there is no color fringing visible.

HORIZONTAL CONVERGENCE

If a covering was used in the above steps to show only a vertical row of dots, rearrange so that only the center horizontal row of dots are visible.

Turn blue screen and blue brightness controls fully counter clockwise.

Adjust green and red horizontal amplitude controls, red horizontal phase slug (B4) and the green horizontal phase (B5) until the red and green dots are equally spaced from each other in the same direction.

Adjust the red and green convergence magnets until the red and green dots coincide to produce yellow dots.

Readjust if necessary, red and green horizontal amplitude controls and phase slugs until the dots overlap evenly and only yellow dots are visible.

Turn the green screen and green brightness control fully counter clockwise.

Advance the blue screen and blue brightness controls until the blue dots reappear equal in size to the red dots.

Adjust the blue horizontal amplitude control and the blue horizontal phase slug (B6) until the blue dots are equally spaced in the same direction from the red dots.

Adjust the blue convergence and the blue beam positioning magnets until the blue and red dots coincide to form magenta dots.

Readjust the red and blue horizontal amplitude controls and phase slugs until all the dots are magenta in color with no evidence of red or blue visible.

Turn the red screen control fully counter clockwise. Advance the green screen and the green brightness controls until the green dots appear equal in size to the blue dots.

Adjust the green horizontal amplitude control and the green horizontal phase slug until the green dots overlap the blue dots, thereby producing cyan dots.

Readjust the green convergence magnet, if necessary.

Advance the red screen control until the dots appear white.

Readjust red, blue and green horizontal amplitude controls and phase slugs as well as the red, blue and green convergence magnets, if necessary, until only white dots appear and there is no visible color fringing of any of the dots.

Observe the entire face of the picture tube and make any convergence touch-up adjustments necessary to produce white dots over the entire screen.

BLACK AND WHITE ADJUSTMENTS (GRAY SCALE ADJUSTMENTS)

1. Set the contrast control at approximately one-third of its rotation. Turn the brightness control fully clockwise. Turn the channel selector to an active monochrome channel.
2. Adjust the blue and green brightness controls for a satisfactory black and white picture.
3. Reduce the brightness control to the lowest usable level.
4. Adjust the red, blue and green screen controls for a black and white picture.
5. Turn the brightness control fully clockwise and repeat step 2.
6. Rotate the brightness control from maximum to minimum and check the black and white picture. If a color change is observed in the picture, repeat the above procedure until a black and white picture is obtained at all settings of the brightness control.

CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

RAYTHEON MODELS C-21C1-B, -M,
M-21C0-B, -M (Ch. 21CT1C)

FOLDER 4

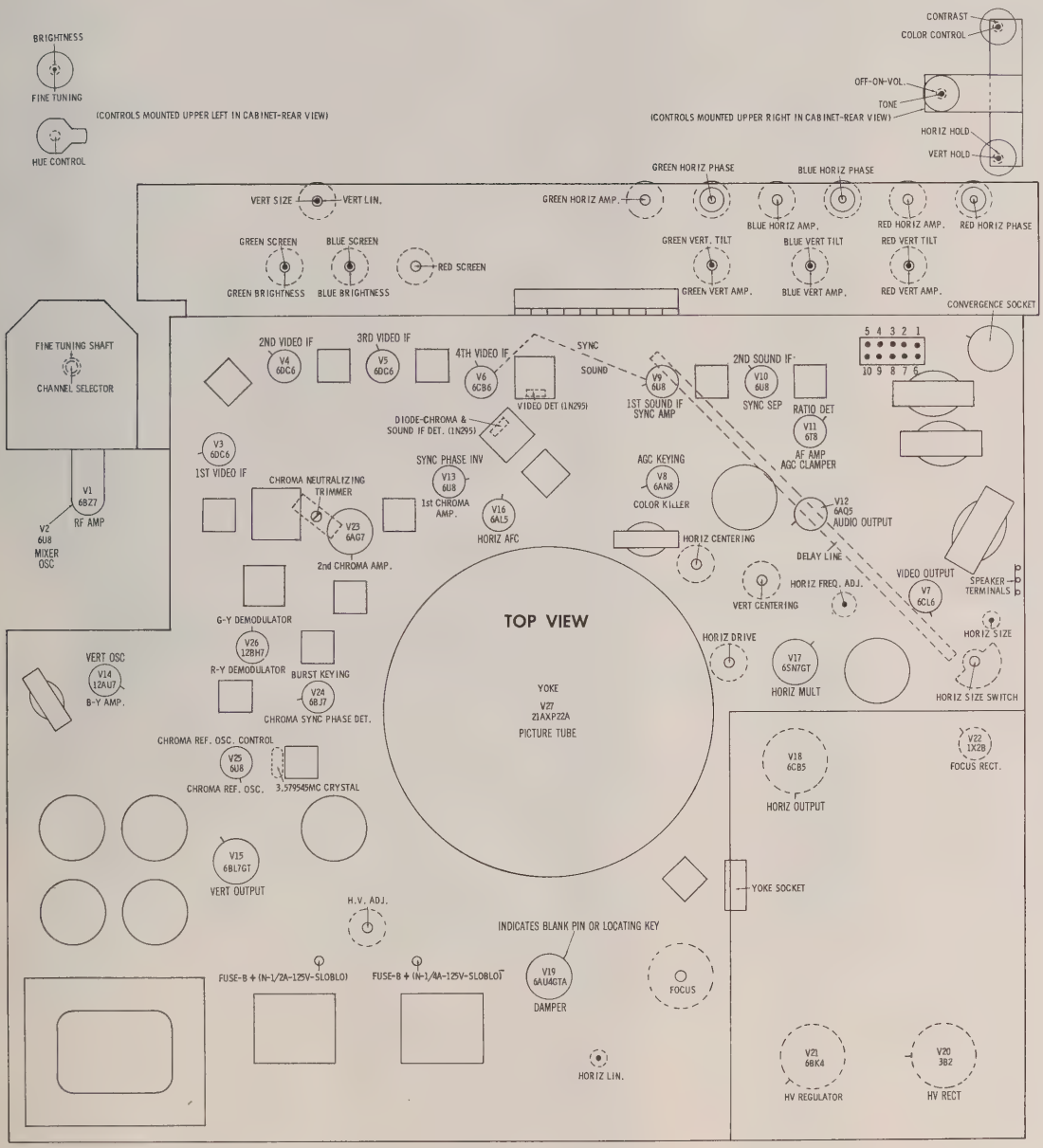
RESISTANCE MEASUREMENTS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6BZ7	§ 470Ω	300K	INF	0Ω	.1Ω	INF	1.5Meg	22Ω	0Ω
V2	6U8	§ 10K	200K	§ 108K	.1Ω	0Ω	§ 8200Ω	0Ω	0Ω	10K
V3	6DC6	75K	47Ω	.1Ω	0Ω	§ 2700Ω	§ 2700Ω	0Ω		
V4	6DC6	75K	56Ω	.1Ω	0Ω	§ 2800Ω	§ 2800Ω	0Ω		
V5	6DC6	35K	47Ω	.1Ω	0Ω	§ 2900Ω	§ 2900Ω	0Ω		
V6	6CB6	.1Ω	330Ω	.1Ω	0Ω	§ 800Ω	§ 800Ω	0Ω		
V7	6CL6	• 180Ω	4400Ω	§ 5600Ω	.1Ω	0Ω	† 6500Ω	0Ω	§ 5600Ω	4400Ω
V8	6AN8	§ 32K	14Meg	▲ 0Ω	INF	INF	500K	† 10K	§ 40K	§ 0Ω
V9	6U8	§ 7300Ω	470K	§ 10K	.1Ω	0Ω	§ 10K	82Ω	0Ω	40K
V10	6U8	§ 35K	100K	§ 12K	.1Ω	0Ω	§ 1000Ω	0Ω	0Ω	3.2Meg
V11	6T8	INF	15K	INF	0Ω	.1Ω	1.5Meg	0Ω	10Meg	§ 200K
V12	6AQ5	120K	0Ω	.1Ω	0Ω	§ 310Ω	§ 0Ω	120K		
V13	6U8	§ 3300Ω	3.5Meg	§ 13K	0Ω	.1Ω	§ 1500Ω	▲ 0Ω	2700Ω	1Meg
V14	12AU7	† 16K	16K	5600Ω	0Ω	0Ω	• † 870K	• 1.2Meg	0Ω	.1Ω
V15	6BL7GT	2.2Meg	† 230Ω	•600Ω	2.2Meg	† 230Ω	• 600Ω	0Ω	.1Ω	
V16	6AL5	• 45Ω	• 45Ω	.1Ω	0Ω	4.8Meg	TP	4.8Meg		
V17	6SN7GT	5.2Meg	† 6100Ω	1800Ω	100K	† 120K	1800Ω	.1Ω	0Ω	
V18	6CB5	NC	0Ω	0Ω	NC	470K	NC	.1Ω	† 10K	TOP CAP ‡5.5Ω
V19	6AU4GTA	NC	NC	¶	NC	† 3.5Ω	NC	0Ω	.1Ω	
V20	3B2		PINS	1 THRU 8	HAVE	INFINITE	RESISTANCE			TOP CAP ‡500Ω
V21	6BK4	§ 0Ω	0Ω	NC	NC	• † 450K	NC	.1Ω	NC	TOP CAP INF
V22	1X2B	15Meg	15Meg	NC	15Meg	15Meg	15Meg	NC	15Meg	15Meg
V23	6AG7	0Ω	.1Ω	NC	500Ω	0Ω	† 18K	0Ω	† 3800Ω	
V24	6BJ7	11Meg	4.4Ω	0Ω	.1Ω	0Ω	4.4Ω	220Ω	10Meg	4.4Ω
V25	6U8	§ 600Ω	100K	§ 15K	.1Ω	0Ω	† 8500Ω	0Ω	2700Ω	10Meg
V26	12BH7A	§ 13K	2.2Ω	0Ω	.1Ω	.1Ω	§ 13K	11K	0Ω	0Ω
V27	21AXP22A	§ 56K	† 150K	• 530K	• † 55K	• † 55K	• 150K	• § 530K	NC	• 11Meg
		PIN 10 NC	PIN 11 • § 480K	PIN 12 • 170K	PIN 13 • † 55K	PIN 14 §56K				

† MEASURED FROM 420V SOURCE.
‡ MEASURED FROM PIN 3 OF V19.
§ MEASURED FROM 200V SOURCE.
▲ MEASURED FROM -15V SOURCE.
• THIS READING WILL VARY. CONTROL SET FOR NORMAL OPERATION.
¶ THIS READING CAN VARY GREATLY, (10K MINIMUM), DUE TO THE CONDITION OF THE ELECTROLYTIC CAPACITOR CONNECTED IN THE ASSOCIATED CIRCUIT.
NC NO CONNECTION.
TP TIE POINT.

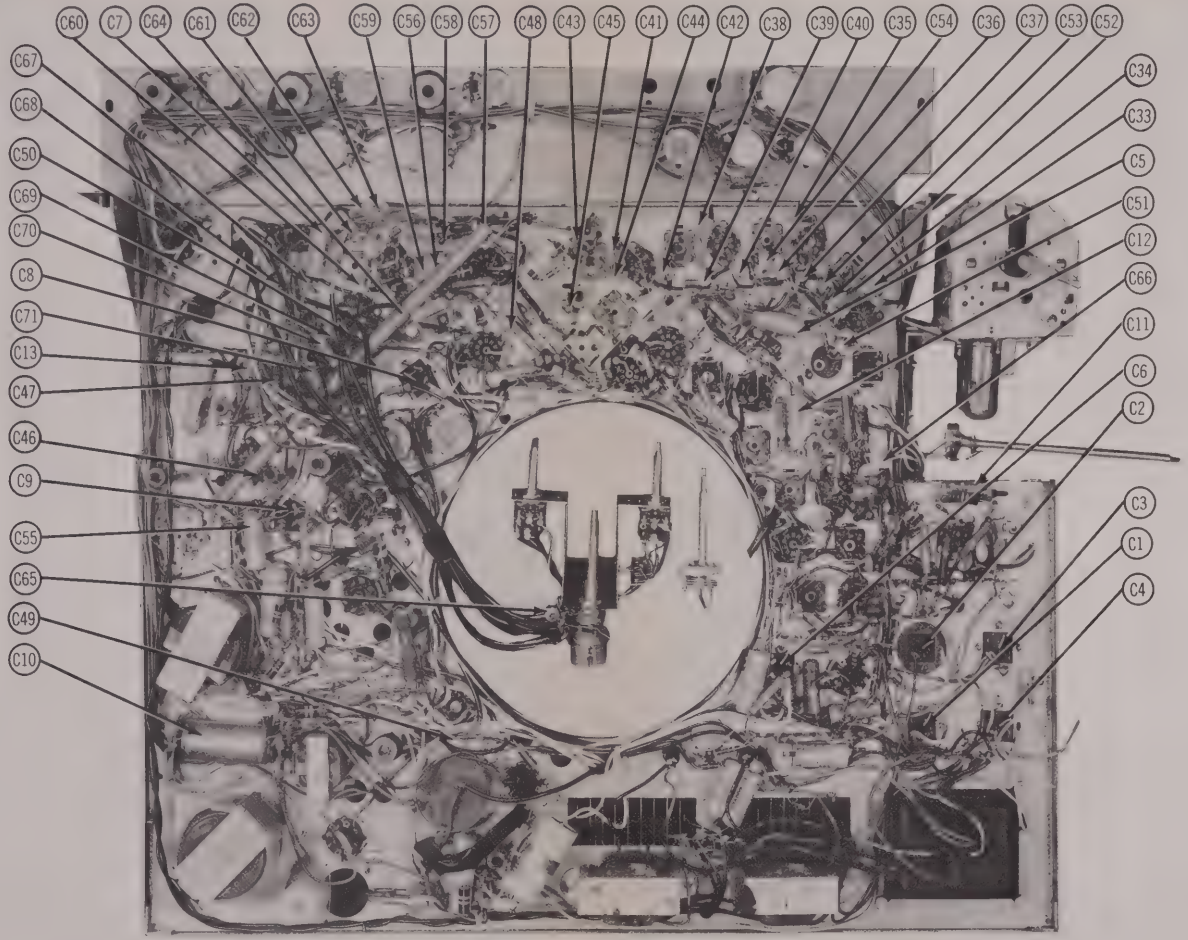
TUBE PLACEMENT CHART

L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

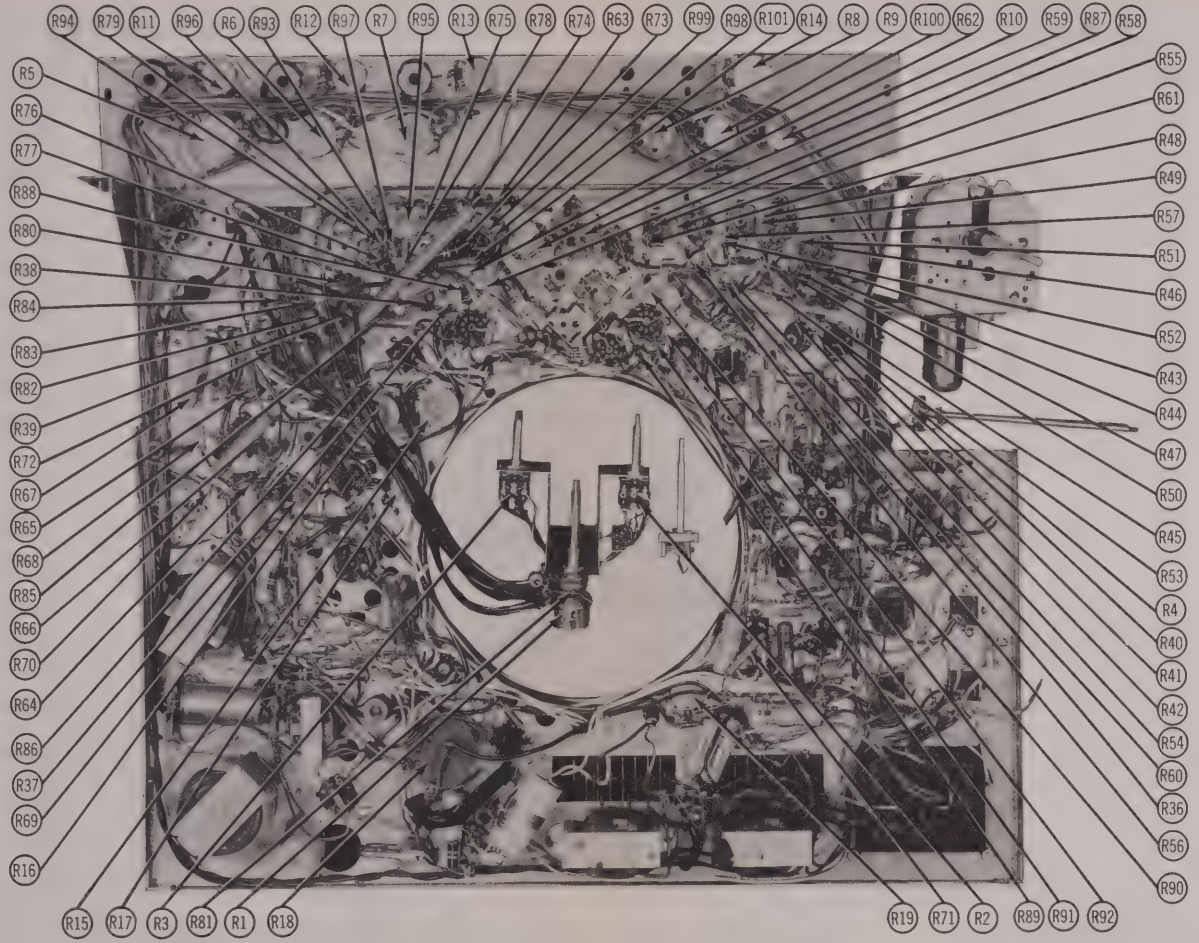


RAYTHEON MODELS C-21C1-B, -M, M-21CO-B, -M (Ch. 21CT1C)

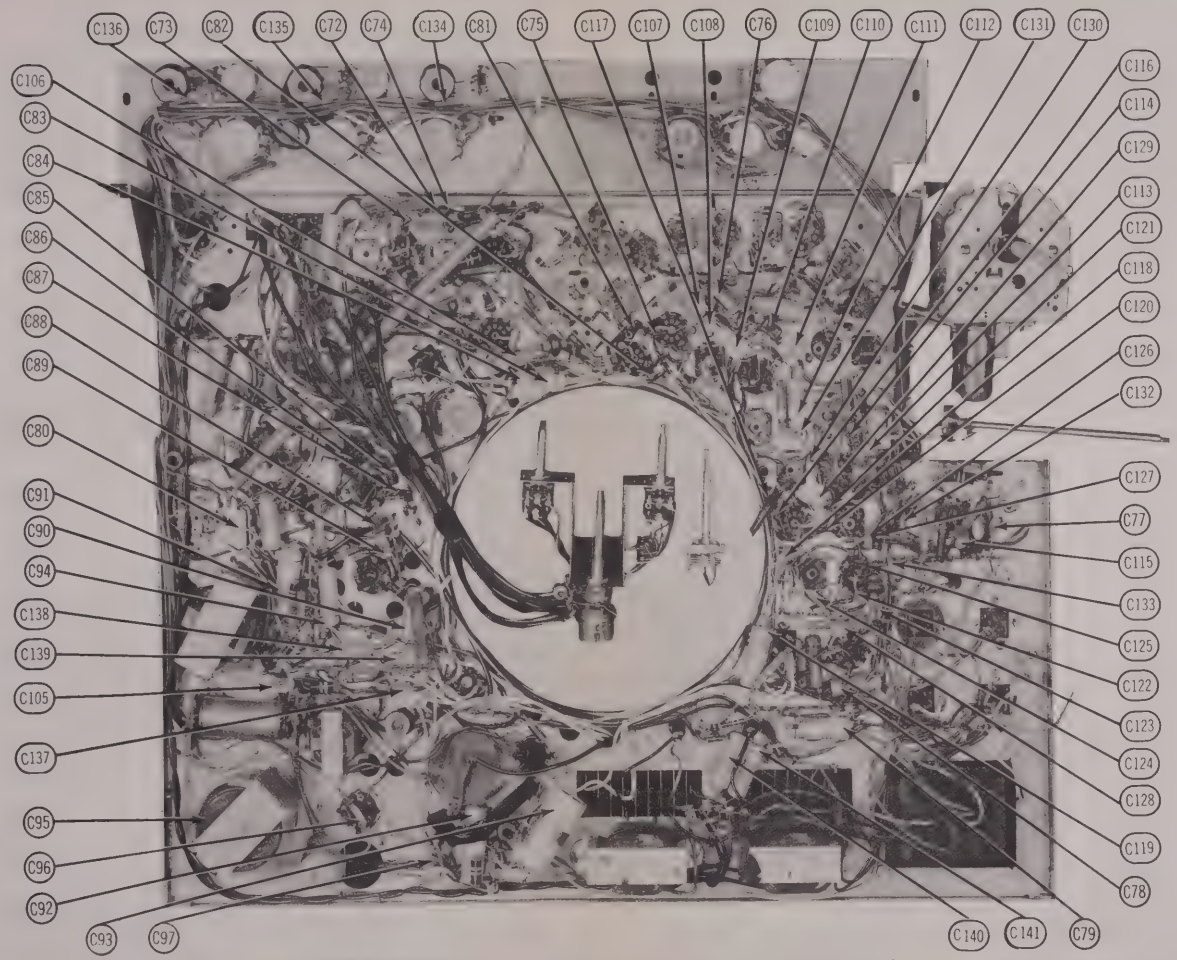
FOLDER 4



CHASSIS BOTTOM - CAPACITOR IDENTIFICATION (C1 THRU C71)



CHASSIS BOTTOM - RESISTOR IDENTIFICATION (R1 THRU R101)



CHASSIS BOTTOM - CAPACITOR IDENTIFICATION (C72 THRU C141)

PROPERTY OF
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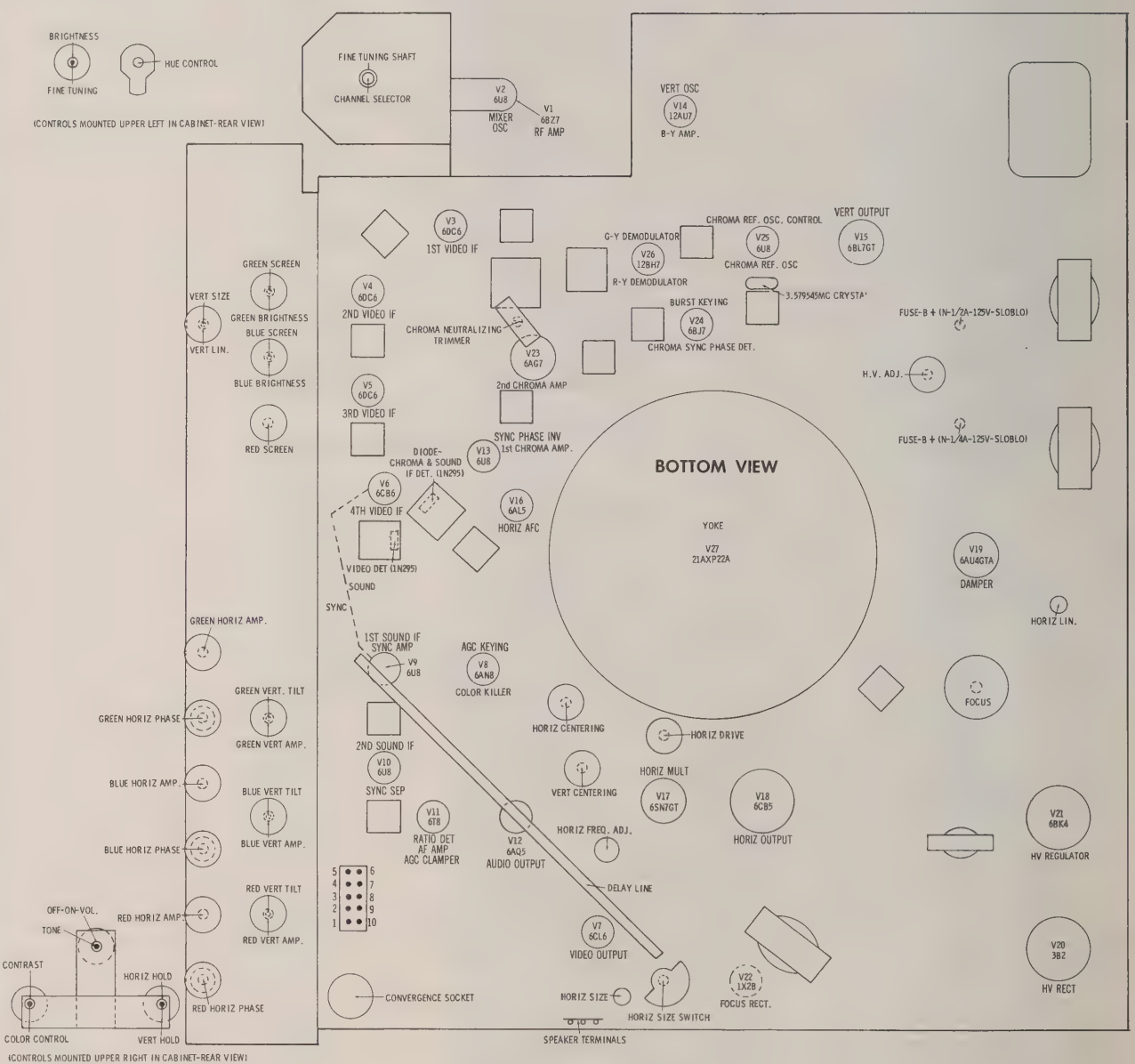
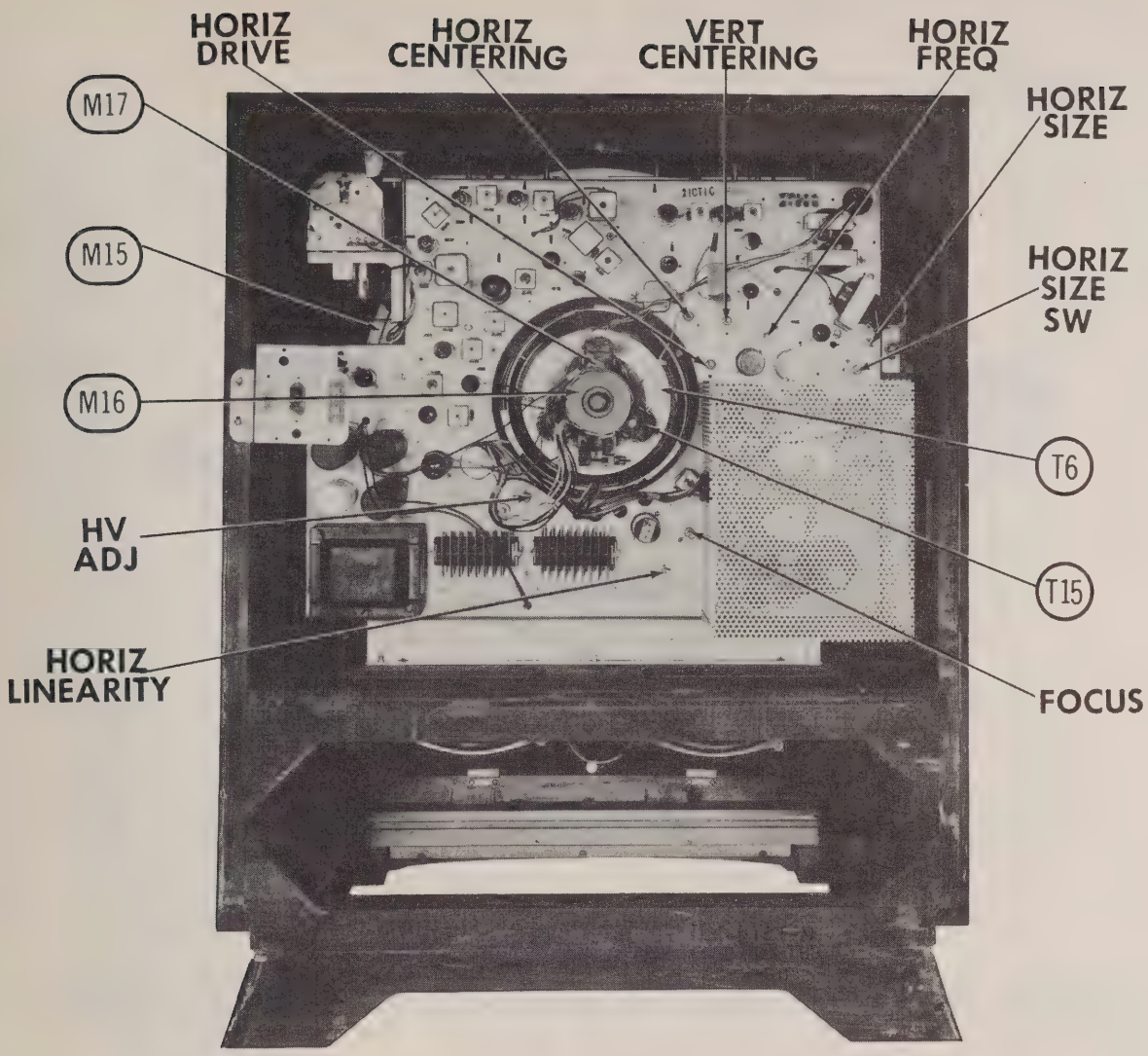
DENVER, COLORADO



TUBE PLACEMENT CHART



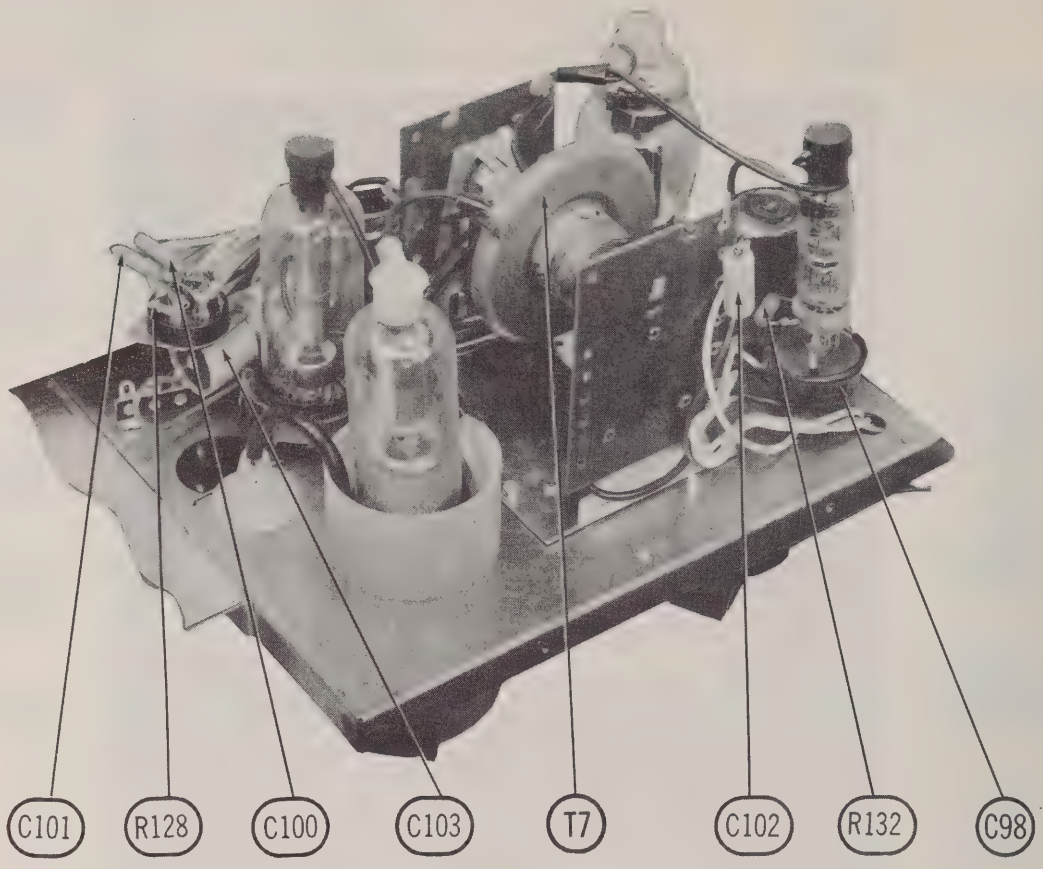
PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

CABINET—REAR VIEW

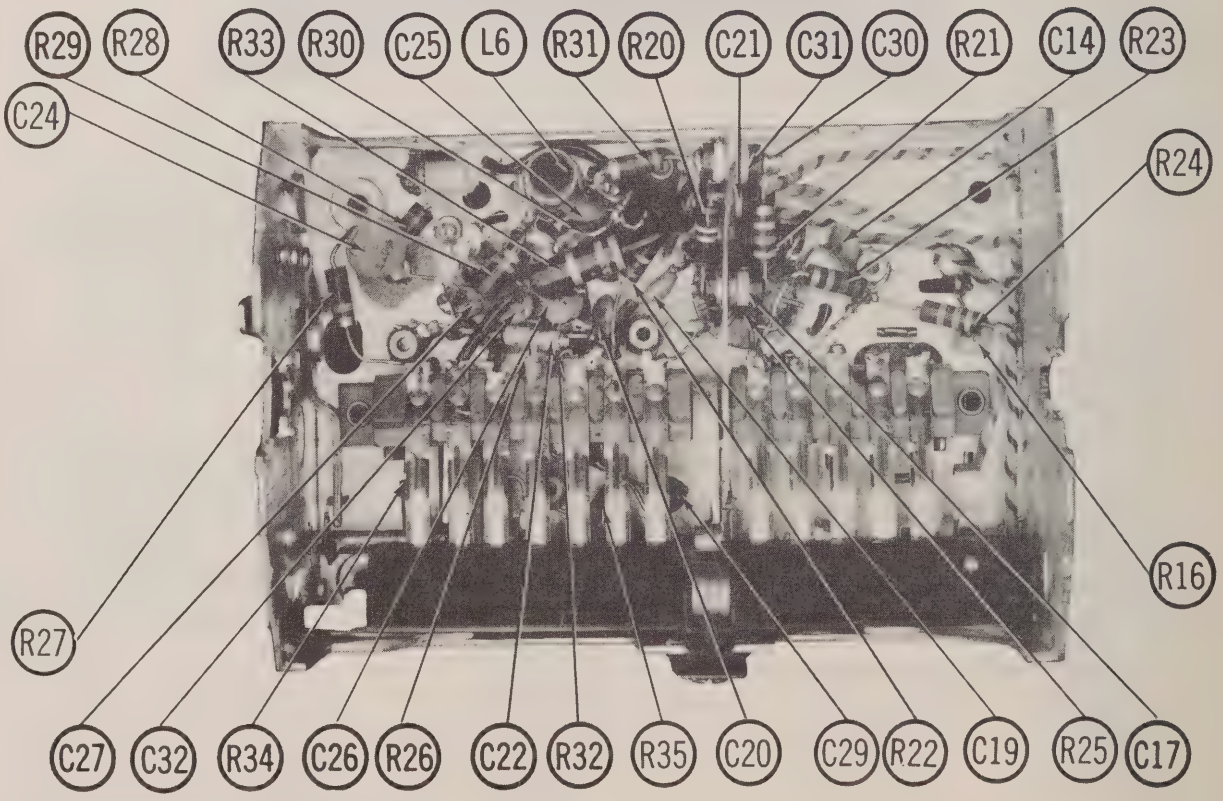
DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 9 push-on type knobs from the front.
2. Remove 4 wood screws holding 2 knob escutcheons.
3. Remove 10 wood screws and the rear cover.
4. Remove 2 bolts from the upper rear corners of the cabinet, and remove the top.
5. Remove 2 wood screws and the AC interlock.
6. Remove the control mounting brackets by removing 2 wood screws and 2 metal screws accessible under the removed escutcheons.
7. Remove 2 wood screws holding the rear support bracket.
8. Remove 2 speaker leads.
9. Remove 3 bottom and 2 side chassis bolts.
10. Remove the ground spring from chassis to neutralizing magnet.
11. Remove the picture tube socket, convergence yoke plug, yoke plug, purity magnet, blue beam positioning magnet, convergence yoke, deflection yoke.
12. Partially remove the chassis and remove the HV lead connector. NOTE: Discharge HV to picture tube harness.
13. Remove the chassis.



HI-VOLTAGE COMPARTMENT



RF TUNER-BOTTOM VIEW

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	RF Amplifier	6BZ7	
V2	Mixer-Oscillator	6U8	
V3	1st. Video IF Amp.	6DC6	
V4	2nd. Video IF Amp.	6DC6	
V5	3rd. Video IF Amp.	6DC6	
V6	4th. Video IF Amp.	6CB6	
V7	Video Output	6CL6	
V8	AGC Keying-Color Killer	6AN8	
V9	1st. Sound IF - Sync Amp.	6U8	
V10	2nd. Sound IF - Sync Sep.	6U8	
V11	Ratio Det. -AF Amp. - AGC Clamper	6T8	
V12	Audio Output	6AQ5	
V13	Sync Phase Inverter- 1st. Chroma Amp.	6U8	
V14	Vert. Osc. - B-Y Amp.	12AU7	
V15	Vert. Output	6BL7GT	
V16	Horiz. AFC	6AL5	
V17	Horiz. Mult.	6SN7GT	
V18	Horiz. Output	6CB5	
V19	Damper	6AU4GTA	
V20	HV Rectifier	3B2	
V21	HV Regulator	6BK4	
V22	Focus Rectifier	1X2B	
V23	2nd. Chroma Amp.	6AG7	
V24	Burst Keying- Chroma Sync- Phase Det.	6BJ7	
V25	Chroma Ref. Osc. Control- Chroma Ref. Osc.	6U8	
V26	G-Y Demodulator- R-Y Demodulator	12BH7A	

PICTURE TUBE

ITEM No.	REPLACEMENT DATA			NOTES
	RAYTHEON PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	
V27	21AXP22A	21AXP22A	21AXP22A	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	RAYTHEON PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	200	250	8C-26120	AFHS1-37-30	XA0318	FP126	TMS-75	S-160 MT-2540	TVL-1547
C2	200	250	8C-26120	AFHS1-37-30	XA0318	FP126	TMS-75	S-160 MT-2540	TVL-1547
C3	200	250	8C-26120	AFHS1-37-30	XA0318	FP126	TMS-75	S-160 MT-2540	TVL-1547
C4	90	475	8C-26117	AFH1-57	A0570	FP187	TMS-71	S-305	TVL-1850
C5	2	25	8C-26299	PRS50V2	BBR2-50	TC302	TD-2-25	FM-0502	TVA-1202
C6A	▲10	25	8C-26121					D-015 MTD-0210	R2436 *
B	■10	25							
C	▲1000	15							
C7	4	75	8C-26297	PRS150V4	BBR4-150	TC40	TD-4-150	FM-1504	TVA-1402
C8A	■4	50	8C-26119	AFH4-60		FP376.6 TC30		Q-035 MT-0504	R2435 *
B	▲25	25							
C	10	25							
D	▲10	450							
C9A	▲10	350	8C-26118	AFH4-10	DO480	FP434	TMQ-80	Q-330	TVL-4750
B	▲10	450							
C	10	25							
D	■10	450							
C10	500	6	8C-26070①	PRS6VNP500	BR1000-6 † BR1000-6	TC610 † TC610	TD-1000-6 † TD-1000-6	MTH-06100 † MTH-06100	R2434*
C11	4	75	8C-26297	PRS150V4	BBR4-150	TC40	TD-4-150	FM-1504	TVA-1402
C12	4	150	8C-26298	PRS150V4	BBR4-150	TC40	TD-4-150	FM-1504	TVA-1402
C13	4	150	8C-26298	PRS150V4	BBR4-150	TC40	TD-4-150	FM-1504	TVA-1402

* Non-catalog item.
† Connect negative leads together.
① Non-polarized unit.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	RAYTHEON PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C14	3			NP0-SI 3.0	TCZ-3.3	C10V3C	TCO-3	ZT-553	5TCCB-V3	NP0
C15	3-9				829-10		532-B			
C16	1000			BPD-001	DD-102	BYA6D1	ED-1000	DC521	5HK-D1	
C17	800									
C18	.5-3				829-3		3115-D	CT565A		
C19	1.5			NP0-SI 1.5	TCZ-1R5	C10V15C	TCO-1.5	ZT-5515	5TCCB-V15	NP0
C20	47									N140
C21	800									
C22	47									
C23	.3-2.5									
C24	220			BPD-00022	DD-221	L10T22	ED-220	UC-5322	5GA-T22	
C25	30									N75
C26	10			NP0-SI 10	TCZ-10	L10Q1	ED-10	UC-541	5GA-Q1	
C27	5			NP0-SI 5	TCZ-5	L10V5	ED-5	ZT-555		
C28	.5-3				829-3		3115-D	CT565A		
C29	1000			BPD-001	DD-102	BYA6D1	ED-1000	DC521	5HK-D1	
C30	800									
C31	800									
C32	1000			BPD-001	DD-102	BYA6D1	ED-1000	DC521	5HK-D1	
C33	680			BPD-00068	DD-681	BYA10T68	ED-680	UC-5368	5GA-T68	
C34	800			BPD-008	DD-801	L10T8	ED-800		5GA-T8	
C35	680			BPD-00068	DD-681	BYA10T68	ED-680	UC-5368	5GA-T68	
C36	800			BPD-0008	DD-801	L10T8	ED-800		5GA-T8	
C37	800			BPD-0008	DD-801	L10T8	ED-800		5GA-T8	
C38	680			BPD-00068	DD-681	BYA10T68	ED-680	UC-5368	5GA-T68	
C39	800			BPD-0008	DD-801	L10T8	ED-800		5GA-T8	
C40	800			BPD-0008	DD-801	L10T8	ED-800		5GA-T8	
C41	800			BPD-0008	DD-801	L10T8	ED-800		5GA-T8	
C42A	800			BPD-0008	DD-801	L10T8	ED-800		5GA-T8	
B	800			BPD-0008	DD-801	L10T8	ED-800		5GA-T8	
C43	800			BPD-0008	DD-801	L10T8	ED-800		5GA-T8	
C44	3.4			NP0-SI 3.3	TCZ-3R3	C10V33C	TCO-3.3	ZT-5533	5TCCB-V33	
C45	82			1469-000082	TCZ-82	22R5Q82	TCO-82		MS-482	5%
C46	150			1469-00015	DD-151	22R5T15	TCO-150	ZT-5315	MS-315	10%
C47	.0068	600		P688N-0068	D6-682	CUB6D68	GP-6800	GEM-6268	6TM-D68	
C48	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C49	470	2000		HVD-30-470	DD30-471	HVB20T47	HD3-470	DC30347	20GA-T47	
C50	5000			BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	
C51	800			BPD-0008	DD-801	L10T8	ED-800		5GA-T8	
C52A	800			BPD-0008	DD-801	L10T8	ED-800		5GA-T8	
B	800			BPD-0008	DD-801	L10T8	ED-800		5GA-T8	

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP	RATING VOLT	REPLACEMENT DATA RAYTHEON PART No.	ARROVOX PART No.	CENTRALAB PART No.	CORNELL DUBILIER PART No.	IRC PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C53	800			BPD-0008	DD-801	LST8	ED-800		30A-T8	
C54	800			BPD-0008	DD-801	LST8	ED-800		30A-T8	
C55	.047	600		BPD-05	DF-503	CUB6847		GEM-6147	ETM-247	
C56	5000			BPD-005	DD-502	BYA6D6	ED-005	DC525	BHK-D5	
C57	5000			BPD-005	DD-502	BYA6D6	ED-005	DC525	BHK-D5	
C58	50			1469-000056	DD-501	22R5Q50	ED-001	DC516	BHK-E5	10%
C59	5000			BPD-005	DD-502	BYA6D6	ED-005	DC525	BHK-D5	
C60	5000			BPD-005	DD-502	BYA6D6	ED-005	DC525	BHK-D5	
C61	1000			BPD-001	DD-402	BYA6G	ED-001	DC521	BHK-E5	
C62	1000			BPD-001	DD-402	BYA6H	ED-001	DC521	BHK-E5	
C63	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	BHK-S1	
C64	5	600		BPD-01	DD-103	CUB6S	ED-01	DC511	BHK-S1	
C65	.033	400		BPD-03	DF-203	CUB22	ED-03	GEM-4022	ETM-S22	
C66	5	300		P288N-5		CUB2F5		GEM-205	ETM-P5	
C67	.047	600		BPD-047	DD-472	CUB4747	GP-4700	GEM-4247	ETM-J47	
C68	270			1469-00027	TC2-270	22R5T27	TC0-270	GEM-301	MS-327	10%
C69	1	300		P288N-1		DF-104	CUB1F1	GEM-201	ETM-P1	
C70	.0047	600		BPD-0047	DD-472	CUB4747	GP-4700	GEM-6247	ETM-247	
C71	400			P488N-1		DF-104	CUB4P1	GEM-401	ATM-P1	
C72	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	BHK-S1	
C73	330			1469-00033		22R5T33			MS-333	10%
C74	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	BHK-S1	
C75	470			1469-00047	DD-470	22R5Q47	TC0-47		MS-447	10%
C76	4700			1487-0047	DD-472	19S041			LFM-247	Note 1
C77	5000			BPD-005	DD-502	BYA6D6	ED-005	DC525	BHK-D5	
C78	400			P488N-1		DF-104	CUB4P1	GEM-401	ATM-P1	
C79	33	400		P488N-33			CUB4P33	GEM-433	ATM-P33	
C80	.01	1600		P1688N-01	DD-103		CUB16S1	GEM-1611	16TM-S1	
C81	1000			1494-001			1R5S1		MS-S1	10%
C82	1000			1494-001			1R5S1		MS-S1	10%
C83	5000			BPD-005	DD-502	BYA6D6	ED-005	DC525	BHK-D5	
C84	5000		200	BPD-005	DD-502	CUB6847		GEM-6147	ETM-247	
C85	2000	10000	8G-26069						MS-333	10%
C86	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	BHK-S1	
C87	1500	10000	8G-26134						1TM-329	10%
C88	1500	10000	8G-26073						MS-329	10%
C89	180	3000							MS-347	10%
C90	120	5000							1TM-Z19	
C91	100	5000							MS-347	10%
C92	022	600		P488N-22				GEM-6122	ETM-P22	
C93	25	1000	8D-26142							
C94	.047	1600		BPD-05	DF-503	CUB6847		GEM-6147	ETM-S47	
C95	2000	10000	8G-26069							
C96	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	BHK-S1	
C97	1500	10000	8G-26134							
C98	1500	10000	8G-26073							
C99	180	3000								N1500
C100	120	5000								N1500
C101	100	5000		HVD-50-100	DD60-101	HVB50T1			50GA-T1	
C102	022	600		BPD-02	DF-203	CUB622		GEM-6122	ETM-S22	
C103	25	1000	8D-26142							
C104	25	1000	8D-26143							
C105	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	BHK-S1	
C106	01	400		BPD-01	DD-103	CUB4S1	GP-10000	GEM-411	ATM-S1	
C107	.0000			BPD-01	DD-103	BYA6S1	ED-01	DC511	BHK-S1	
C108	5000			BPD-005	DD-502	BYA6D5	ED-005	DC525	BHK-D5	
C109	5000			BPD-005	DD-502	BYA6D6	ED-005	DC525	BHK-D5	
C110	360		8E-26071	D6-360	D6-360	18S736			MS-356	10%
C111	60-280									
C112	5000			BPD-005	DD-502	BYA6D5	ED-005	DC525	BHK-D5	
C113	5000			BPD-005	DD-502	BYA6D5	ED-005	DC525	BHK-D5	
C114	33			1469-000033	DD-330	22R5Q33	TC0-33		MS-433	10%
C115	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	BHK-S1	
C116	1000			BPD-001	DD-102	BYA6G1	ED-001	DC521	BHK-E5	
C117	22			1469-000022	D6-220	22R5Q22	TC0-22		MS-422	10%
C118	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	BHK-S1	
C119	22	200		P288N-22		CUB2F22		GEM-2022	ETM-P22	
C120	1000			1494-001		1R5S1			MS-S1	10%
C121	1000			1494-001		1R5S1			MS-S1	10%
C122	1.2			BPD-01 2	TCZ-1R2	CSV33C	TC0-2 2		ETCCB-V32	
C123	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	BHK-S1	
C124	5000			BPD-005	DD-502	BYA6D6	ED-005	DC525	BHK-D6	
C125	82			1469-000082	D6-820	22R5Q82	TC0-82		MS-482	10%
C126	1000			BPD-001	DD-102	BYA6G1	ED-001	DC521	BHK-D5	
C127	27			1469-000027	D6-270	19S027			1TM-427	
C128	5000			BPD-005	DD-502	BYA6D6	ED-005	DC525	BHK-D6	
C129	5000			BPD-005	DD-502	BYA6D5	ED-005	DC525	BHK-D5	
C130	33			1469-000033	DD-330	22R5Q33	TC0-33		MS-433	10%
C131	5-7		8E-26174		RDH-10		532-10			
C132	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	BHK-S1	
C133	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	BHK-S1	
C134	3200			1467-0032	D6-322	19W032	UC-5232	UC-5232	1FM-232	
C135	2200			1467-0022	D6-222	19W022	ED-0022	UC-5222	1FM-222	
C136	2200			1467-0022	D6-222	19W023	ED-0022	UC-5222	1FM-222	
C137	1000			HVD-30-680	D030-681	HVB20T68	R03-680	DC30268	ETM-S1	
C138	01	2000		BPD-01	DD-103	CUB6S1	GP-10000	GEM-S1	ETM-S1	
C139	01	600		BPD-01	DD-103	CUB6S1	GP-10000	GEM-S1	ETM-S1	
C140	047	600		BPD-01	DD-103	CUB6S1		GEM-S1	ETM-S1	
C141	047	600		BPD-05	DF-503	CUB6S47		GEM-6147	ETM-S47	
C142	047	600		BPD-05	DF-503	CUB6S47		GEM-6147	ETM-S47	

Note 1 Some versions may use an 800 MMF

CONTROLS

ITEM No.	RATING RESIST ANCE	RATING WATTS	REPLACEMENT DATA RAYTHEON PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	2Meg		10A-38057	J1-S7		UE2468		Tone
B	1Meg			R2-S7		Not Req.		Volume - Top ② 300K
C	Switch			R3-1		Not Req.		
R2A	500Ω		10B-39060	J1-1		UE87		Contrast
B	300mA			R3-8		Not Req.		Color
R3A	10K		10B-38068	J1-S2		UE781		Horiz. Hold
B	1Meg			R3-S1		Not Req.		Vert. Hold
R4	500K		10B-39059					Brightness
R5A	250Ω	2 (WW)	10B-26707					Red Vert. Amp.
B	250Ω	2 (WW)						Red Vert. Tilt
R6A	250Ω	2 (WW)	10B-26707					Blue Vert Amp.
B	250Ω	2 (WW)						Blue Vert Tilt
R7A	250Ω	2 (WW)	10B-26707					Green Vert Amp
B	250Ω	2 (WW)						Green Vert Tilt
R8A	1Meg		10B-26109	B-S9	A47-1Meg-S	QB-137	U54	Red Screen
B	Shaft			Not Req	KS8-3	Not Req.	Not Req.	
R9A	500K		10B-38120	J1-42		†† {	UF53L	Blue Bright
B	1Meg			R3-S6			UR58L	Blue Screen

CONTROLS (Continued)

ITEM No.	RATING RESIST ANCE	RATING WATTS	REPLACEMENT DATA RAYTHEON PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R10A	500K			J1-40				Green Bright
B	1Meg			R3-S1				Green Screen
R11A	1000Ω		10B-26108	B-S	A47-1000-S	QB-108	U4	Red Horiz Amp
B	Shaft			Not Req.	KS8-3	Not Req.	Not Req.	
R12A	1000Ω		10B-26108	B-S	A47-1000-S	QB-108	U4	Blue Horiz. Amp.
B	Shaft			Not Req.	KS8-3	Not Req.	Not Req.	
R13A	1000Ω		10B-26108	B-S	A47-1000-S	QB-108	U4	Green Horiz Amp
B	Shaft			Not Req.	KS8-3	Not Req.	Not Req.	
R14A	1000Ω	3(WW)	10B-36113			WP1000		Vert. Lin.
B	1Meg	3(WW)				WM100		Vert. Bias
R15A	100Ω	3(WW)	10D-36113			WP100		Horiz. Centering
B	100Ω	2(WW)				WM100		Horiz Centering
R16A	200Ω	3(WW)	10D-26113			WP200		Vert Centering
B	200Ω	2(WW)	10D-26113			WM200		Vert Centering
R17A	5000Ω	1	10B-26357	B-10	A47-5000-S	QB-114	U14	Horiz Drive
B	Shaft			Not Req.	KS8-3	Not Req.	Not Req.	
R18	5Meg	2	10B-38100					Focus
R19A	1Meg	1	10B-19296	AB-89	A47-1Meg-S	QB-137	U54	Hi-Voltage Adjustment
B	Shaft			AK-1	FKS-1/2	SQ	Not Req.	

+ Concentrikit Equivalent K-4 Kit, Base Elements & Shafts Bu-139, P1-210 (Panel)
Bu-137, R1-133 (Rear)
TS-1 (Switch)

++ Concentrikit Equivalent K-2 Kit, Base Elements & Shafts Bu-103, P1-118 (Panel)
Bu-110, R1-150 (Rear)

† Concentrikit Equivalent K-2 Kit, Base Elements & Shafts Bu-116, P1-116 (Panel)
Bu-137, R1-139 (Rear)

†† Concentrikit Equivalent K-3 Kit, Base Elements & Shafts Bu-133, P8-02 (Panel)
Bu-131, R13-108 (Rear)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA RAYTHEON PART No.	IRC PART No.	NOTES
R20	820K			BTS-820K	
R21	470K			BTS-470K	
R22	470Ω			BTS-470	
R23	22K			BTS-22K	
R24	47K			BTS-47K	
R25	22Ω			BTS-22	
R26	6800Ω			BTS-6800	
R27	100K			BTS-100K	
R28	100K			BTS-100K	
R29	100K			BTS-100K	
R30	33Ω 5%			BTS-33 5%	
R31	3300Ω			BTS-3300	
R32	10K			BTS-10K	
R33	3300Ω	1		BTA-3300	
R34	130Ω			BTS-130	
R35	33K			BTS-33K	
R36	6800Ω 5%	2		BTS-6800 5%	
R37	470K				
R38	2.2Meg				
R39	10Meg			BTS-10Meg	
R40	6800Ω 5%			BTS-6800 5%	
R41	8200Ω 5%			BTS-8200 5%	
R42	1000Ω			BTS-1000	
R43	100Ω 5%			BTS-10 5%	
R44	2700Ω	1		BTA-2700	Note 1
R45	470Ω 5%			BTS-47 5%	
R46	47K 5%				
R47	1000Ω				
R48	10Ω 5%				
R48	2700Ω	1		BTA-2700	
R50	100Ω			BTS-100	
R51	560 5%			BTS-56 5%	
R52	1000Ω				
R53	47K 5%			BTS-47K 5%	
R54	47K 5%			BTS-47K 5%	
R55	2700Ω	1		BTA-2700	
R56	100Ω			BTS-100	
R57	47Ω			BTS-47	
R58	39000 5%				
R59	470Ω			BTS-470	
R60	100Ω			BTS-100	
R61	3300 5%			BTS-330 5%	
R62	47K			BTS-47K	
R63	4700Ω			BTS-4700	
R64	15K			BTS-15K	
R65	43000 5%			BTS-4300 5%	
R66	100Ω			BTS-100	
R67	15000Ω	10	9C-26313		
R68	180K	2		BTA-180K	
R69	56000	2		BTS-5600	
R70	580Ω			BTS-580	
R71	180Ω	2		BTS-180	
R73	8Ω 5%	1		BTA-8 5%	
R73	33K	2		BTS-33K	
R74	22Ω			BTS-22	
R75	100K			BTS-100K	
R76	18K			BTS-18K	
R77	1000Ω			BTS-1000	
R78	33K			BTS-33K	
R79	39K			BTS-39K	
R80	15K			BTS-15K	
R81	33K			BTS-33K	
R82	10Meg			BTS-10Meg	
R83	100K			BTS-100K	
R84	100K			BTS-100K	
R85	330K			BTS-330K	
R86	330K			BTS-330K	
R87	33K			BTS-33K	
R88	10K			BTS-10K	
R89	1Meg			BTS-1Meg	
R90	3300Ω			BTS-3300	
R91	470Ω			BTS-470	
R92	2200Ω			BTS-2200	
R93	470K			BTS 470K	
R94	2.7Meg			BTS-2.7Meg	
R95	47K			BTS-47K	
R96	39K			BTS-39K	
R97	150K			BTS-150K	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA RAYTHEON PART No.	IRC PART No.	NOTES
R98	47K			BTS-47K	
R99	100K			BTS-100K	
R100	150K			BTS-150K	
R101	8200Ω 5%	2		BTS-8200 5%	
R102	1Meg			BTS-1Meg	
R103	1Meg 5%			BTS-1Meg 5%	
R104	470K			BTS-470K	
R105	56K			BTS-56K	
R106	100Ω			BTS-100	
R107	100Ω			BTS-100	
R108	2.2Meg			BTS-2.2Meg	
R109	10K			BTS-10K	
R110	470Ω	1		BTA-470	
R111	8200Ω 5%				
R112	10000Ω				
R113	100K			BTS-100K	
R114	100K			BTS-100K	
R115	4.7Meg				
R116	4700Ω				
R117	100K	1		BTS-100K	
R118	560Ω 5%	1			
R119	120K			BTS-120K	
R120	470Ω				
R121	8200Ω 5%	1		BTS-1800 5%	
R122	6800Ω				
R123	470K			BTS-470K	
R124	470K			BTS-470K	
R125	100Ω			BTS-100	
R126	10K	10	9C-26311	1 3/4A-10K	
R127	120Ω	1		BTA-120	
R128	4700Ω	3		BTA-4700	
R129	10K	3		BTD-10K	
R130	1000Ω	1		BTA-1000	
R131	15K	1		BTA-15K	
R132	560K	1		BTA-560K	
R133	2.2Meg	2		BTB-2.2Meg	Note 2
R134	2.2Meg	3		BTB-2.2 Meg	Note 3
R135	2.2Meg	3		BTB-2.2 Meg	Note 3
R136	2.2Meg	3		BTB-2.2Meg	Note 3
R137	56K			BTS-56K	
R139	1Meg			BTS-1Meg	
R139	1.8Meg			BTS-1.8Meg	
R140	10K	1		BTA-10K	
R141	12K	1		BTA-12K	
R142	56K	1		BTS-56K	
R143	47K			BTS-47K	
R144	15K	1		BTA-15K	
R145	1500Ω	1		BTA-1500	
R146	1000Ω			BTS-1000	
R147	1200Ω			BTS-1200	
R148	470Ω	1		BTA-470	
R149	15K	3		BTB-15K	
R150	3300Ω	7	9C-26313	PWR-3300	
R151	5.6Meg			BTS-5.6Meg	
R152	3.9Meg			BTS-3.9Meg	
R153	680K			BTS-680K	
R154	4.7Meg			BTS-4.7Meg	
R155	12K	1		BTA-12K	
R156	68K	1		BTA-68K	
R157	220Ω	1		BTA-220	
R158	10K			BTS-10K	
R159	1Meg 5%			BTS-1Meg 5%	
R160	1Meg 5%			BTS-1Meg 5%	
R161	100K			BTS-100K	
R163	2200Ω				
R163	560Ω			BTS-560	
R164	330K			BTS-330K	
R165	270Ω			BTS-270	
R166	100K			BTS-100K	
R167	5100Ω 5%	2		BTS-5100 5%	
R168	15K			BTS-15K	
R169	1000Ω			BTS-1000	
R170	2200Ω			BTS-2200	
R171	22K	1		BTA-22K	
R172	680Ω	1		BTA-680	
R173	22K	1		BTA-22K	
R174	18K	2		BTB-18K	Note 3
R175	22K	3		BTB-22K	Note 3

RESISTORS (cont)

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA RAYTHEON PART No.	IRC PART No.	NOTES
R176	27K 5%			BTS-27K 5%	
R177	2700Ω			BTS-2700	
R178	1000Ω			BTS-1000	
R179	10K			BTS-10K	
R180	22K	1		BTA-22K	
R181	68K	2		BTS-68K	
R182	51K 5%			BTS-51K 5%	
R183	2700Ω			BTS-2700	
R184	27K 5%			BTS-27K 5%	
R185	270K			BTS-270K	
R186	18K 5%	2		BTB-18K 5%	
R187	58000 5%			BTS-5800 5%	
R188	330K			BTS-330K	
R189	270K			BTS-270K	
R190	270K			BTS-270K	
R191	270K			BTS-270K	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA RAYTHEON PART No.	IRC PART No.	NOTES
R192	330K			BTS-330K	
R193	470K			BTS-470K	
R194	330K			BTS-330K	
R195	560K			BTS-560K	
R196	560K			BTS-560K	
R197	68K			BTS-68K	
R198	56K			BTS-56K	
R199	150K			BTS-150K	
R200	22K	2		BTB-22K	Note 4
R201	22K	3		BTB-22K	Note 4
R202	22K	2		BTB-22K	Note 4
R203	10Ω	1		BTA-10	
R204	1000 5%			BTS-1000 5%	
R205	56K			BTS-56K	Note 5
R206	470K			BTS-470K	

Note 1. Some versions may use a 10K in this application.
Note 2 Some versions may use a single 8 Meg, 2W to replace R133, R134, R135 and R136.
Note 3 Some versions may use a single 39K, 2W to replace R174 and R175
Note 4. Some versions may use a single 56K, 2W to replace R200, R201 and R202
Note 5. Some versions may use a 100K in this application.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	RAYTHEON PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	UTVAC	180V	6.3V	13.8VCT	12A-26092					
	@ 4A	Tap @ 170V	@1.8A	@ 7.8A						
		@ 530A								

TRANSFORMER (FILAMENT)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	RAYTHEON PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T2	6 3V	6 3V			12D-26982		P-3297 ↓			
	@ .7A	@ 45A								

↓ Drill one new mounting hole

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	RAYTHEON PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T3	Vert. Osc.	12M-16341	B6703	A-3003	V406	A-8125	28A03	A-97X
T4	Vert. Output	12E-26726						
T5	Vert. Isolation	12M-26515						
T6A	Yoke-Horiz. (12M1E)	30L-26346-1						
B	Vert (12M1E)							
T7	Horiz Output	12E-26939						
T8	Horiz Size Coil (.35MH + 2 1MH)	13M-26260	RF804	MWC-2 ↓	20HR13A	WC-7	WC-33 ↓	WLC-7 ②
T9	Horiz Linearity Coil (.35MH + 2.2MH)	13M-26269	RF804	MWC-2 ↓	20HR13A	WC-7	WC-33 ↓	WLC-7 ②
T10	Low Isolation Inductor Coil (16 8MH)	13M-26158						
T11	High Isolation Inductor Coil (265MH)	13M-26078						
	All-High Isolation Inductor Coil	13M-26076-1						
T13	Green Horiz. Convergence Phase Coil	13M-26708						
	Blue Horiz Convergence Phase Coil	13M-26708						
T14	Red Horiz. Convergence Phase Coil	13M-26708						
T15	Convergence Yoke Assy.	56P-26711 ①						

① Enlarge mounting hole
② Use lap.
③ Includes green, blue and red convergence coils.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	RAYTHEON PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T16	4600Ω	3 2Ω 1 & 1 6Ω	12C-26085						

SPEAKER

ITEM No.	TYPE SIZE	TYPE FIELD	TYPE V C IMP	RAYTHEON PART No.	QUAM PART No.	NOTES
SP1	6" x 9"	PM	3-4Ω	18A-24035 ↓	69A3	↓ Used in Models C-21C1-M, C-21C1-B
	5" x 7"	PM	3-4Ω	18A-19696 ↓	57A1	② Used in Models M-21C0-B, M-21C0-M
SP2	6" x 9"	PM	3-4Ω	18A-24035 ②	69A3	

COILS (RF-IF)

ITEM No.	USE	RAYTHEON PART No.	NOTES
L1	Ant. Filter Coils	31K-235-01	Includes complete assy.
L2A	VHF Ant. Coils	31M-013-2	Channel 2
B	"	31M-013-3	Channel 3
C	"	31M-013-4	Channel 4
D	"	31M-013-5	Channel 5
E	"	31M-013-6	Channel 6
F	"	31M-013-7	Channel 7
G	"	31M-013-8	Channel 8
H	"	31M-013-9	Channel 9
I	"	31M-013-10	Channel 10
J	"	31M-013-11	Channel 11

ITEM No.	USE	RAYTHEON PART No.	NOTES
L3C	VHF RF & Osc. Coils	31M-113-4	Channel 4
D	"	31M-113-5	Channel 5
E	"	31M-113-6	Channel 6
F	"	31M-113-7	Channel 7
H	"	31M-113-9	Channel 9
I	"	31M-113-9	Channel 9
J	"	31M-113-10	Channel 10
K	"	31M-113-11	Channel 11
L	"	31M-113-12	Channel 12
M	"	31M-113-13	Channel 13
L4	UHF Ant. Coils	31M-013- -10	

RAYTHEON MODELS C-21C1-B, -M, M-21C0-B, -M (Ch. 21CTIC)

FOLDER 4

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (cont)

ITEM No.	USE	RAYTHEON PART No.	NOTES
K	"	31M-013-12	Channel 12
L	"	31M-013-13	Channel 13
L3A	VHF RF & Osc. Coils	31M-113-2	Channel 2
B	"	31M-113-3	Channel 3

ITEM No.	USE	RAYTHEON PART No.	NOTES
L5	UHF IF Coils	31M-113-.1U	
L6	Mixer Plate Coil	31K-970	

ITEM No.	USE	REPLACEMENT DATA RAYTHEON PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L7	1st. Video IF	13A-26081				
L8A	41.25MC Trap	13A-26086				
B	47.25MC Trap					
L9	Fil. Choke	16A-25688	19-1001	BC-562	4604	1.5 Microhenries
L10	2nd. Video IF	13M-26083	17-5004 ■	TV-155	6234 ■	■ Use adaptor plate
L11	Fil. Choke	16A-25688	19-1001	BC-562	4604	1.5 Microhenries
L12	3rd. Video IF	13M-26083	17-5004 ■	TV-155	6234 ■	■ Use adaptor plate
L13	Fil. Choke	16A-25688	19-1001	BC-562	4604	1.5 Microhenries
L14	4th. Video IF	13M-26083	17-5004 ■	TV-155	6234	■ Use adaptor plate
L15	Video Det. Assy.	13B-26080-1				Includes caps., coils, M7 and a 5600Ω, 5% resistor
L16	41.25MC Trap	13M-26267				Tapped
L17	Chroma & Sound Det. Assy.	13B-26087				Includes caps., coils, M8, a 470K & a 5600Ω (5%)resistors and 4.5MC trap
L18	Series Peaking Coil	16A-26156	19-1005	BC-566	4612	10 Microhenries
L19	Series Peaking Coil	16A-26417	19-3100	TV-194	6112	102 Microhenries
L20	Series Peaking Coil	16A-26417	19-3100	TV-194	6112	102 Microhenries
L21	3.58MC Trap	13M-26082				
L22	Shunt Peaking Coil	16A-26416	19-3500	TV-188	6144	560 Microhenries
L23A	Series Peaking Coil	16A-26412				
B	Shunt Peaking Coil					
L24	RF Choke	16A-26156	19-1005	BC-566	4612	10 Microhenries
L25	Sound IF	13M-26242	17-3495	TV-113	6203	
L26	Ratio Det.	13M-26243	17-3497	TV-115	6205	Tertiary winding - .7Ω
L27	Chroma Input Coil	13A-26088				Includes 4.5MC trap
L28	RF Choke	16A-26151	19-5100	BC-513	4652	1 Millihenry
L29	1st. Chroma Amp. Plate Coil	13M-26260				
L30	2nd. Chroma Amp. Plate Coil	13M-26411				
L31	Burst Take-off Coil	13B-26264				Tapped @ 2.1Ω
L32	7.2MC Trap	13M-26265				
L33	RF Choke	16A-26161	19-3036	TV-180	6176	39 Microhenries
L34	Chroma Reference Osc. Coil	13M-26263				
L35	RF Choke	16A-26151	19-5100	BC-513	4652	1 Millihenry
L36	Chroma Reference Osc. Plate Coil	13D-26262				
L37	Demodulator Grid Coil	13D-26259				
L38	Demodulator Driver Trans.	13M-26261				
L39	Series Peaking Coil	16A-26151	19-5100	BC-513	4652	1 Millihenry
L40	Series Peaking Coil	16A-26151	19-5100	BC-513	4652	1 Millihenry
L41	RF Choke	16A-26162			4611	8 Microhenries
L42	RF Choke	16A-26155	19-6033			30 Microhenries

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA RAYTHEON PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	RCA TYPE No.	Ram PART No.	Thordarson PART No.	NOTES
L43	73Ω		13M-26310	19-1576	TV-165	6210			HS-7	Horiz. Freq.
L44	.2Ω	43Ω	13M-26258							Horiz. Phase

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D.C. RESISTANCE	RATINGS INDUCTANCE (0 CURRENT 1000 ∿)	REPLACEMENT DATA RAYTHEON PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L45	.330A	41Ω	1.5 HY.	16B-26052	C5037	C-2996	C-2328	26C93	C-17X
L46	.200A	41Ω	1.5 HY.	16B-26052	C5037	C-2996	C-2328	26C93	C-17X

VERT. CONVERGENCE CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D.C. RESISTANCE	RATINGS INDUCTANCE (0 CURRENT 1000 ∿)	REPLACEMENT DATA RAYTHEON PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L47	0MA	20Ω	.2 HY.	16M-26704					
L48	0MA	20Ω	.3 HY.	16M-26705					

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	RAYTHEON PART No.	REPLACEMENT DATA	
K1	Vert. Integrator	2000MMF, 4700MMF, 4700MMF, 22K, 8200Ω, 8200Ω	17A-22376	Aerovox Centralab Cornell-Dubilier Erie Sprague	PA-110 PC-100 115TM1 1405-01 V-1

RECTIFIERS

ITEM No.	RATING CURRENT (Measured)	REPLACEMENT DATA RAYTHEON PART No.	FEDERAL PART No.	GENERAL ELECTRIC PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	NOTES
M1	.530A	2IJ26079 ①	1207AH ①		RS650MSL ①	600 ①	① Selenium type.
M2	.530A	2IJ26079 ①	1207AH ①		RS650MSL ①	600 ①	

PARTS LIST AND DESCRIPTIONS (Continued)

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			RAYTHEON PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M3	N	½A 125V S/B	46B-26275	55F-26273	333.500 (N ½A 125V S/B)	346009	N½	HN 3/10 to 1/2
M4	N	1/4A 125V S/B	46B-26276	55F-26274	333.250 (N 1/4A 125V S/B)	346008	N 1/4	HN 0 to 3/10
M5	2" length #26 wire							
M6	2" length #26 wire							

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		RAYTHEON PART No.	CBS PART No.	SYLVANIA PART No.	
M7	1N295 *		1N60	1N60	Video Detector (PT)
M8	1N295 *		1N60	1N60	Chroma & Sound IF Detector (PT)

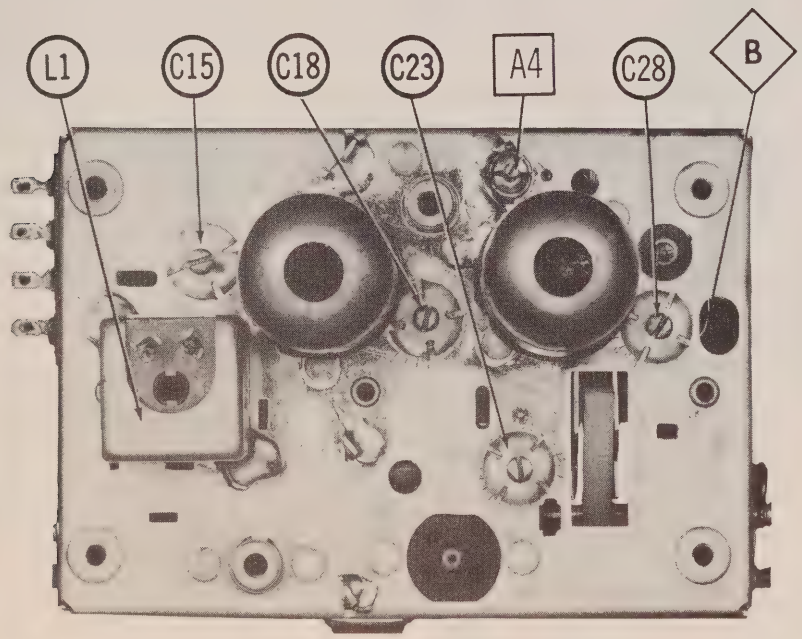
MISCELLANEOUS

ITEM No.	PART NAME	RAYTHEON PART No.	NOTES
M9	Crystal	8M-26102	3.579545MC
M10	Pilot Light	46A-10793	Type #47
M11	Tuner	211-25983	VHF
M12	Hue Adjust	8E-26255	
M13	Delay Line	13M-26093	
M14	Switch	20A-26123	Horiz. Size (Rotary wafer type)
M15	Magnet		Field Equalizing (6 used)
M16	Magnet	55P-26098	Purity
M17	Magnet	55P-26099	Blue Beam Positioner

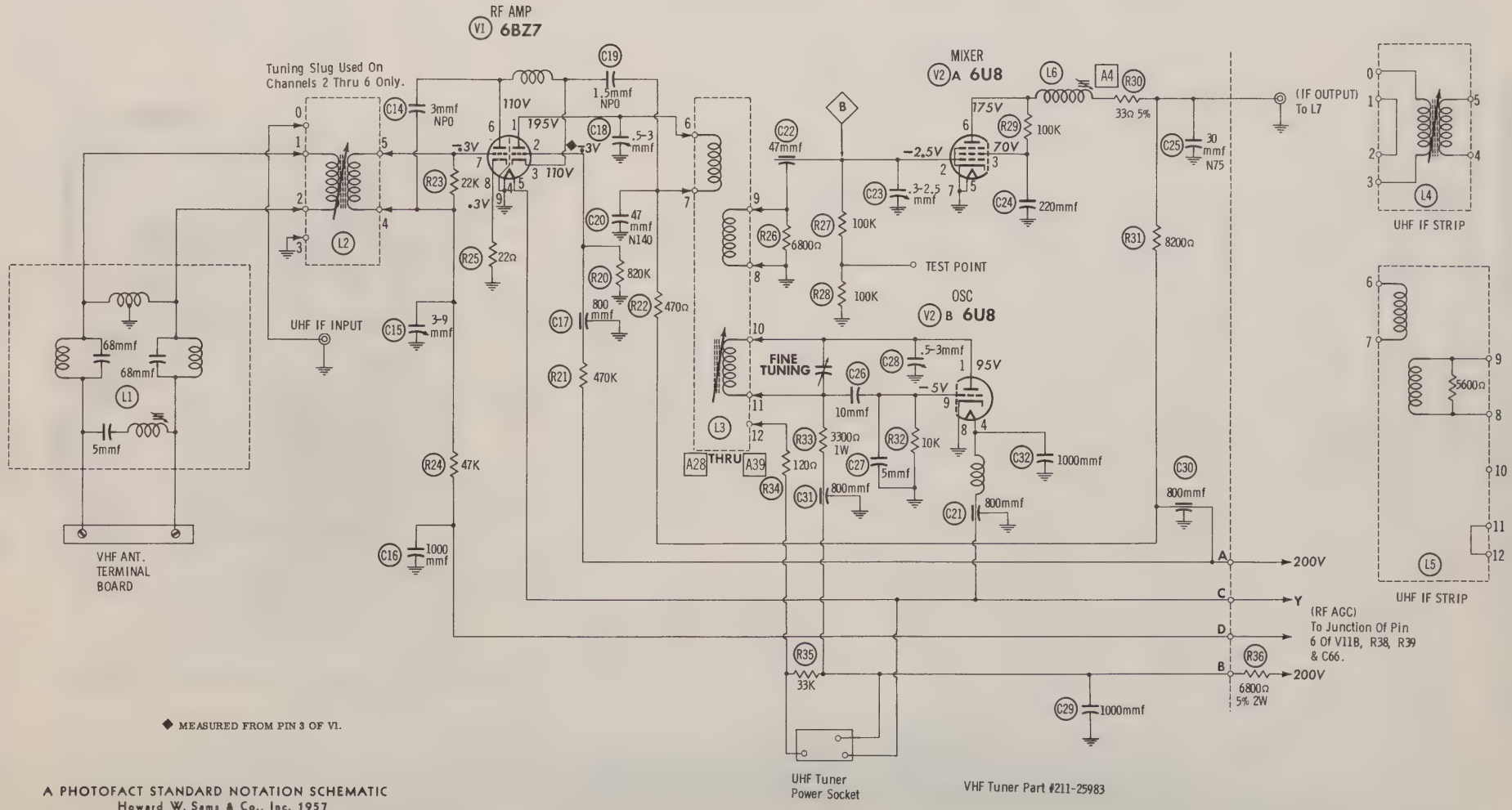
CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Safety Glass	30M-26240	
Mask	25M-26351	
Knob	5B-26323-A201	Tuning knob assy.
Knob	5B-19794-A74	Fine tuning, color, horiz. hold (Models C-21C1-M, M-21C0-M)
Knob	5B-19794-A201	Fine tuning, color, horiz. hold (Models M-21C0-B, C-21C1-B)
Knob	5B-25899-A201	On-off-volume
Knob	5B-25897-A29	Brightness
Knob	5B-19795-A74	Tone, contrast, vert. hold (Models C-21C1-M, M-21C0-M)
Knob	5B-19795A-201	Tone, contrast, vert. hold (Models M-21C0-B, C-21C1-B)
Knob	5B-26325-A74	Hue - Models C-21C1-M, M-21C0-M
Knob	5B-26325-A201	Hue - Models M-21C0-B, C-21C1-B
Cabinet	24D-26183	Model C-21C1-M
Cabinet	24D-26184	Model C-21C1-B
Cabinet	24D-26181	Model M-21C0-M
Cabinet	24D-26182	Model M-21C0-B

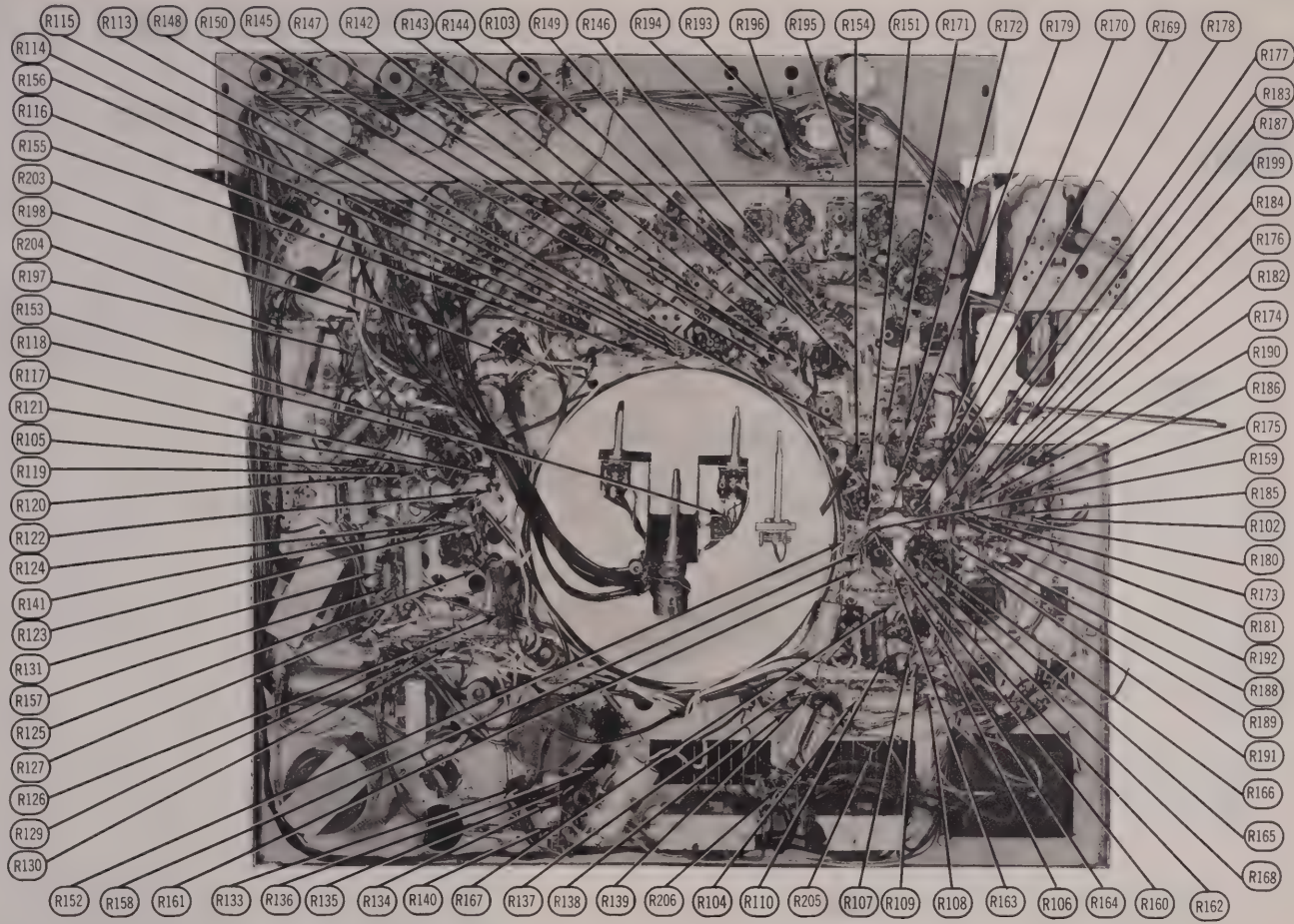


RF TUNER TOP VIEW



A PHOTOFACT STANDARD NOTATION SCHEMATIC
Howard W. Sams & Co., Inc. 1957

TUNER SCHEMATIC



CHASSIS BOTTOM - RESISTOR IDENTIFICATION (R102 THRU R206)

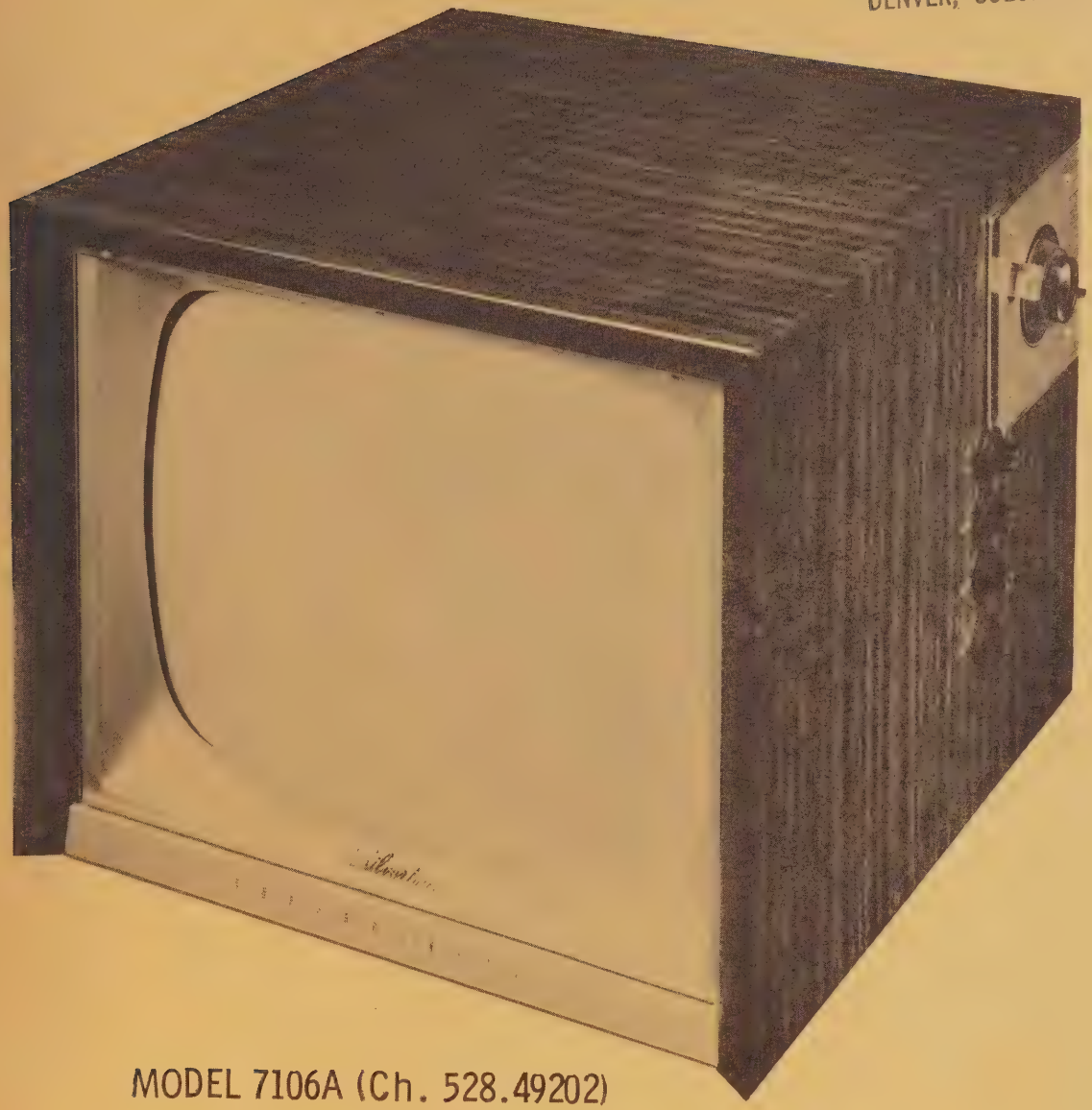
PHOTOFACT* Folder

*TRADE MARK

RETMA MEMBER

SILVERTONE MODELS 7106A, 7107A, 7108A (Ch.528.49200, 528.49201, 528.49202, 528.49210, 528.49211)

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO



MODEL 7106A (Ch. 528.49202)

SILVERTONE MODELS 7106A, 7107A, 7108A (Ch.528.49200, 528.49201, 528.49202, 528.49210, 528.49211)

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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PHOTOFACT* Folder
*TRADE MARK

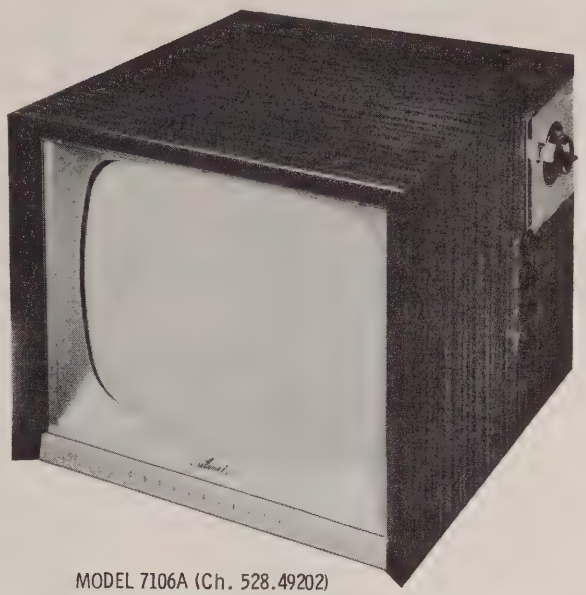
SILVERTONE MODELS 7106A, 7107A, 7108A (Ch.528.49200, 528.49201, 528.49202, 528.49210, 528.49211)

PROPERTY OF
C. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

DISASSEMBLY INSTRUCTIONS

CABINET REMOVAL

1. Remove 6 push-on type knobs from the side.
2. Loosen 8 metal screws and remove the rear cover.
3. Remove 2 metal screws and the antenna terminal board.
4. Remove 2 speaker leads.
5. Remove 6 cabinet bolts from the bottom.
6. Remove the cabinet.
7. Remove 4 speaker nuts and the speaker.



MODEL 7106A (Ch. 528.49202)

TRADE NAME	Silvertone	MODELS	CHASSIS
		7106A, 7108A	528.49200
		7106A, 7108A	528.49201
		7106A	528.49202
		7107A	528.49210
		7107A	528.49211

SUPPLIER	Sears, Roebuck & Co., 925 S. Homan Ave., Chicago, Illinois
TYPE SET	Television Receiver
TUBES	Sixteen
POWER SUPPLY	110-120 Volts AC, 60 Cycle RATING 140 Watts, 1.2 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustment of the VHF oscillator is possible by removing the channel selector and fine tuning knobs. Remove 4 metal screws and the escutcheon. Set the fine tuning at the center of its range. One slug for HIGH band adjustment is located at 8 o'clock, and should be adjusted first. The LOW band adjustment is located at 12 o'clock. Adjust for best picture and sound.

PICTURE TUBE SAFETY GLASS CLEANING

Remove 3 metal screws and the trim strip at the top. Tilt safety glass out and lift up to remove.

SPECIAL ADJUSTMENTS

A. AGC

Observe the picture and advance the AGC control to a point where the picture distorts or a buzz is heard in the sound. Back off from this setting until the picture becomes stable with no noise in the sound.

B. Focus

The focus may be varied in steps by the position of a plug in the focus adjustment socket. Readjust the ion trap for the best focus consistent with maximum brightness.

C. Width

The width may be varied by means of a metallic sleeve located between the yoke and the picture tube neck. Adjust sleeve in or out of the yoke for a picture SLIGHTLY larger than necessary to fill the screen.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

For adjustment of the horizontal oscillator, it is necessary to remove the rear cover and supply power to set. Set the horizontal hold at the center of its range and adjust the horizontal frequency slug (B1) until the picture synchronizes horizontally. (For location, see tube placement chart).

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (A11) located on top of chassis.

FUSE DEVICE

A circuit breaker is used for LV power supply protection and may be reset by depressing the reset button. (For location, see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube. Rotate the two rings around the neck of the tube until the picture is properly centered.

SILVERTONE MODELS 7106A, 7107A, 7108A (Ch.528.49200, 528.49201, 528.49202, 528.49210, 528.49211)

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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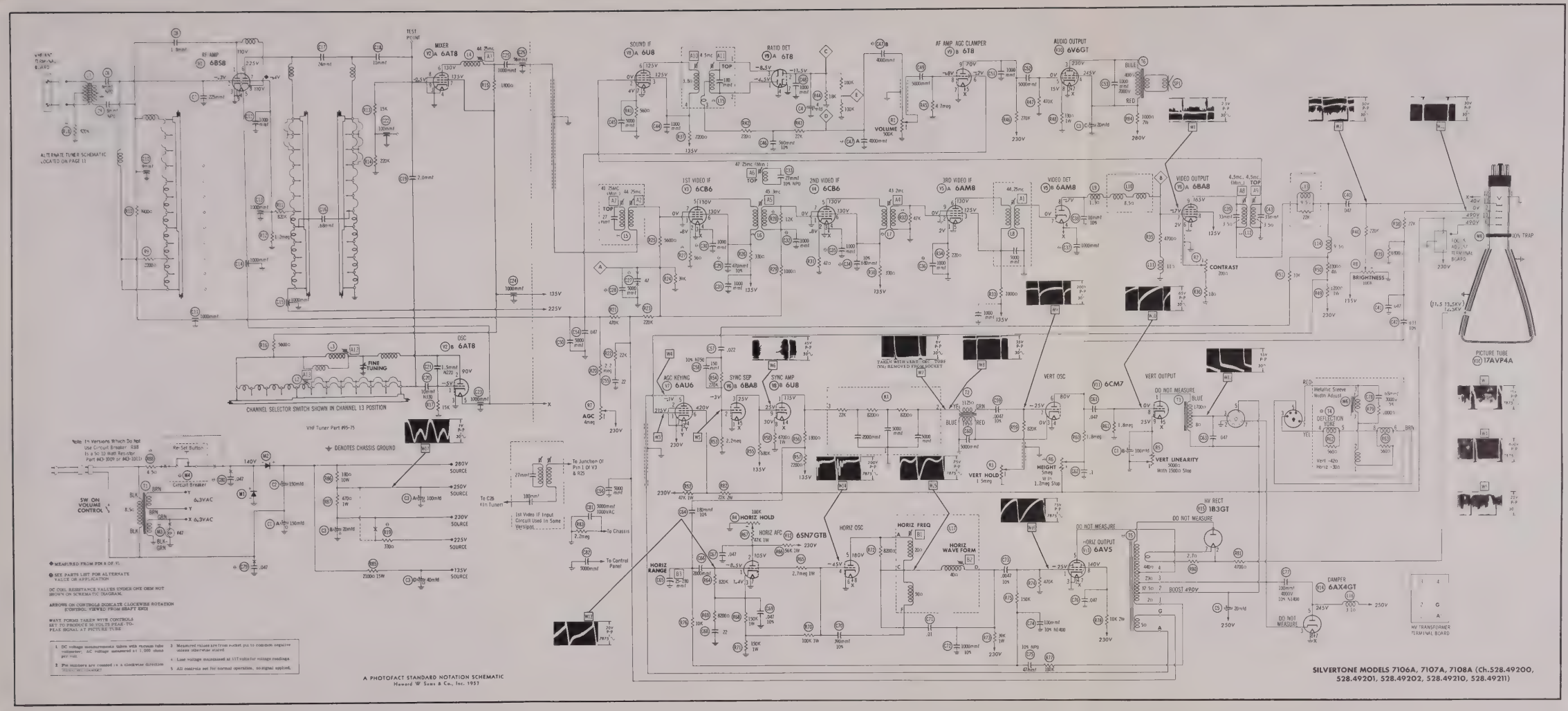
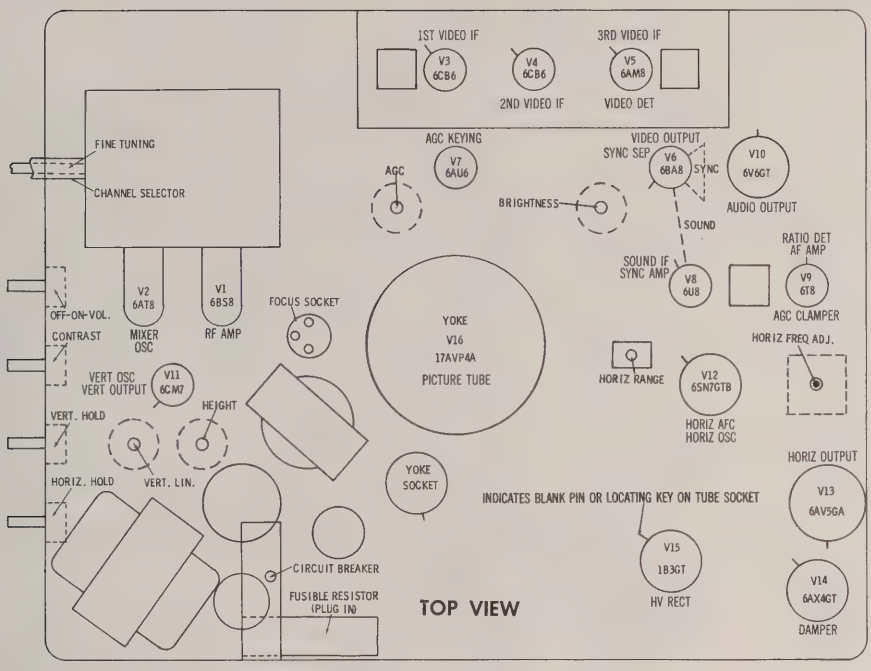


A PHOTOFACT STANDARD NOTATION SCHEMATIC
Howard W. Sams & Co., Inc. 1957

SILVERTONE MODELS 7106A, 7107A, 7108A (Ch.528.49200, 528.49201, 528.49202, 528.49210, 528.49211)

TUBE PLACEMENT CHART

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO



TUBE FAILURE CHECK CHART

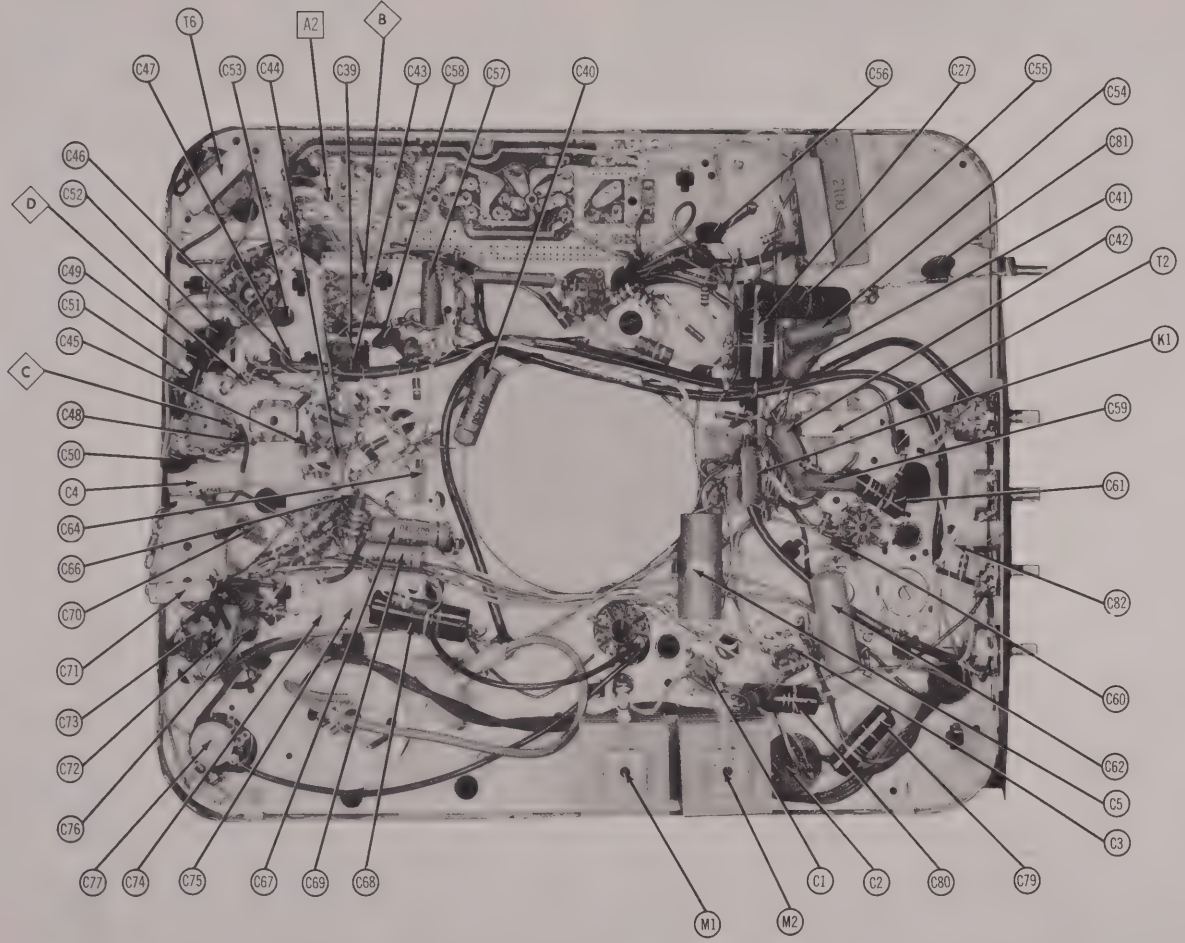
The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - Circuit Breaker (M4), Rectifiers (M1, M2)

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V3, V4, V5, V6
No pic, no sound, has snow - V1, V2, V3
No pic, has sound, has raster - V6, V16
Has pic, no sound - V8, V9, V10
Overloaded picture - V7

SYNC FAILURE
No vert. sync - V6, V8
No horiz. sync - V6, V8, V12
No vert. or horiz. sync - V6, V8

SWEEP FAILURE
No raster, has sound - V12, V13, V14, V15, V16
No vertical deflection - V11
Poor vert. linearity or foldover - V11
Poor horiz. linearity or foldover - V12, V13, V14
Narrow picture - V12, V13, V14, M1, M2
Vert. off freq. - V11
Horiz. off freq. - V12



CHASSIS BOTTOM VIEW-CAPACITOR AND ALIGNMENT IDENTIFICATION

ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

USE AN ISOLATION TRANSFORMER TO PROTECT THE TEST EQUIPMENT.
The high voltage lead should be securely taped and kept away from the chassis.
Do not disable the high voltage circuit by removing the horizontal oscillator tube (V12).

VIDEO IF ALIGNMENT

Connect the negative lead of a 4.5 volt bias supply to point (A). Positive to chassis.
Detune A2, A3, A5, A6 and A7 by turning the cores almost out of the coil forms.
Use only enough generator output to provide a usable indication on VTVM.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	Place a thin insulated metal strip between the mixer-osc. tube (V2) and tube shield. Connect the high side of sweep generator to the metal strip. Low side to chassis.	44.25MC (Unmod)	Any non-interfering channel	DC probe to point (B). Common to chassis.	A1, A2, A3	Attenuate generator output to maintain not more than 2.5 volts on VTVM. Adjust for maximum deflection.
2.	"	"	43.2MC	"	"	A4	"
3.	"	"	45.3MC	"	"	A5	Attenuate generator output to maintain not more than 2.5 volts on VTVM. Adjust for maximum deflection. A5 may be top or bottom slug.
4.	"	"	47.25MC	"	"	A6	Increase generator output and adjust A6 for MINIMUM deflection. A6 may be top or bottom slug. Repeat steps 3 and 4.
5.	"	"	41.25MC	"	"	A7	Increase generator output and adjust A7 for MINIMUM deflection.

OVERALL VIDEO IF RESPONSE CHECK

Attenuate sweep generator output to maintain not more than 2 volts peak to peak on the scope (-3 volts DC at point (B)).
If separate marker generator is used, loosely couple to the output cable of the sweep generator.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use 10MC sweep unless otherwise noted.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6.	Direct	Place a thin insulated metal strip between the mixer-osc. tube (V2) and tube shield. Connect the high side of sweep generator to the metal strip. Low side to chassis.	44.25MC	41.25MC 42.75MC 43.8MC 44.25MC 45.0MC 45.75MC 47.25MC	Any non-interfering channel	Vert. Amp. thru 10K to point (B). Low side to chassis.		Check for response similar to Fig. 1. Retouch A3 to place 45.75MC marker at 50%. Retouch A2 for proper tilt.

SOUND IF ALIGNMENT

Connect two matched 100K (±1%) resistors in series from point (C) to chassis. The junction of these two resistors is alignment point (E) as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
7.	.001MFD	High side to point (B). Low side to chassis.	4.5MC	Any non-interfering channel	DC probe to point (C). Common to chassis.	A8, A9, A10	Adjust for maximum deflection.
8.	"	"	"	"	DC probe to point (D). Common to point (E).	All	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

4.5MC TRAP ALIGNMENT

Tune in a local TV station and check the picture for evidence of 4.5MC beat interference. If necessary, adjust A8 until the horizontal scanning lines are smooth and continuous.

VHF OSCILLATOR ALIGNMENT

Turn the set on and switch to the highest high band channel (13-7) operating in the area and set the fine tuning to the center of its range. Adjust A12 for best picture. Extreme care should be used in making this adjustment because undue pressue on the coil may distort it. Check reception on other high band channels to make sure that each one operating in the area can be tuned in with the fine tuning. If not, a compromise adjustment of A12 will be necessary.

Switch to the highest low band channel (6-2) operating in the area and set the fine tuning to the center of its range. Adjust A13 for best picture. Check other low band channels to see that the fine tuning range is sufficient to obtain a good picture. If not, make compromise adjustment of A13 and again check all low band channels to see that the others have not been seriously affected.

RF AND MIXER ALIGNMENT

This portion of the receiver has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.

UHF ALIGNMENT

This portion of the receiver has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.

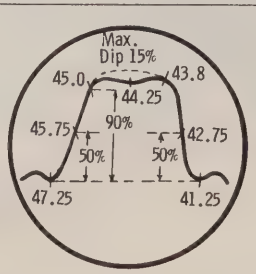
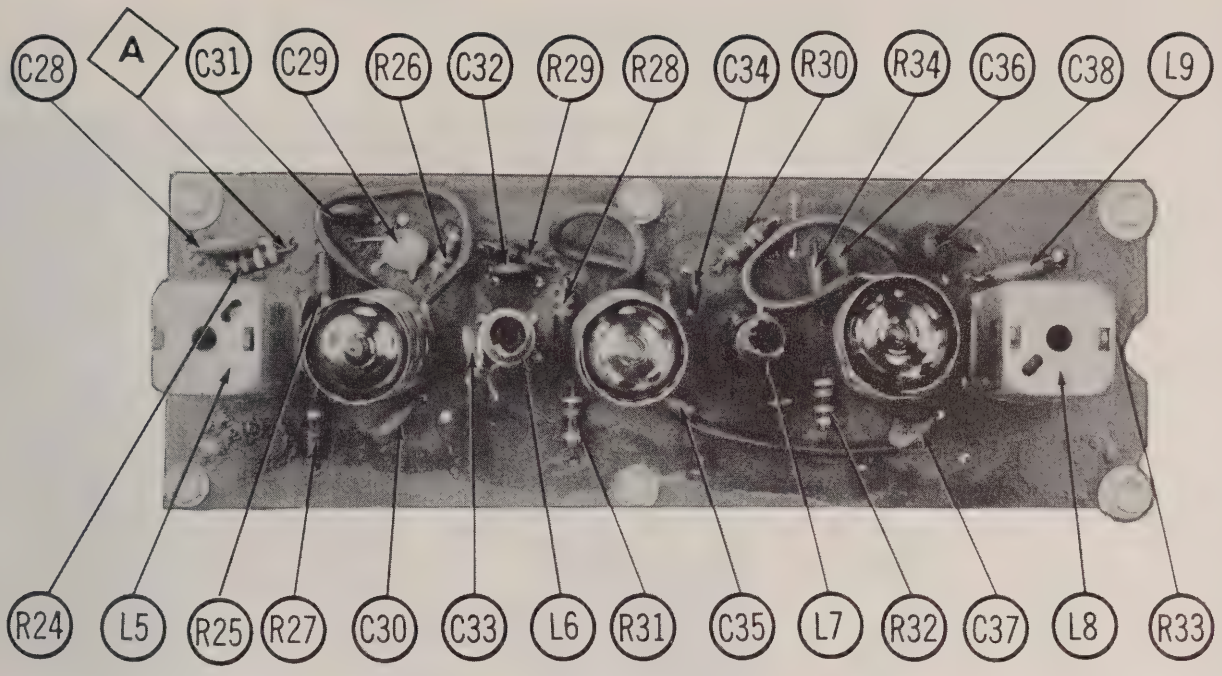
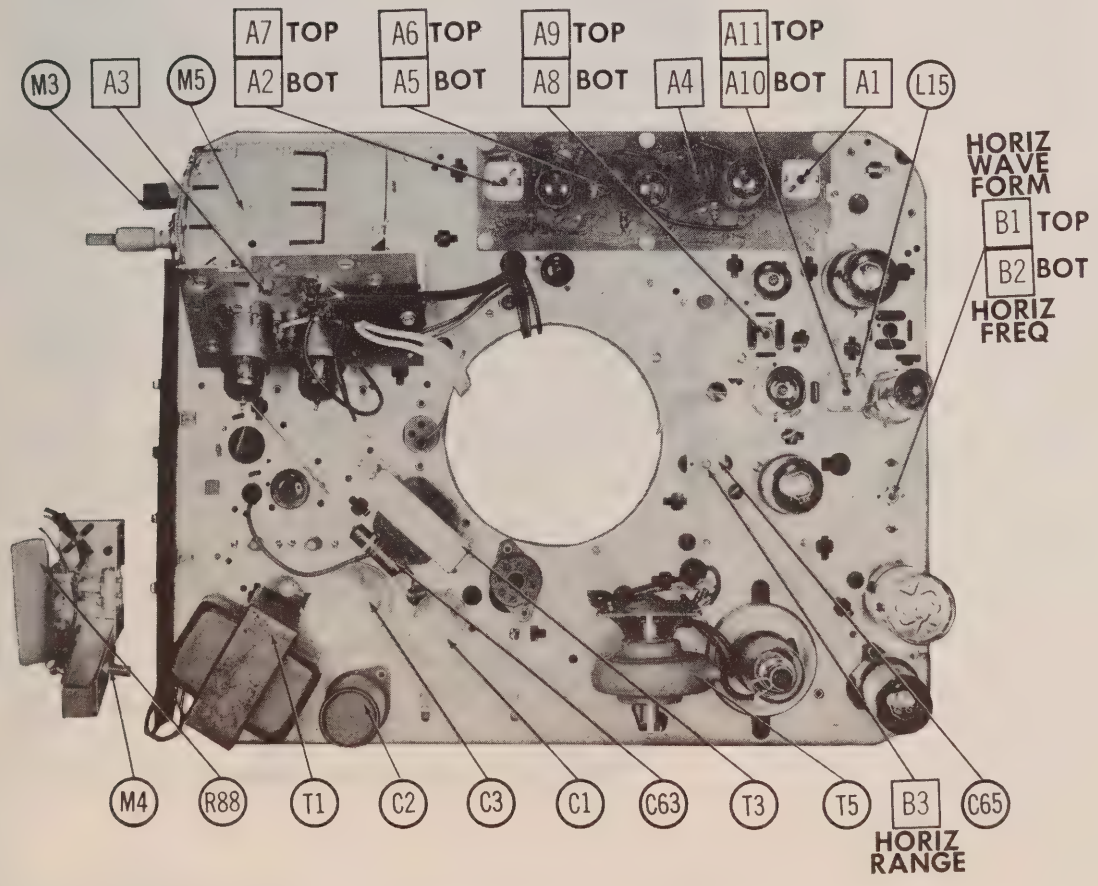


FIG.1

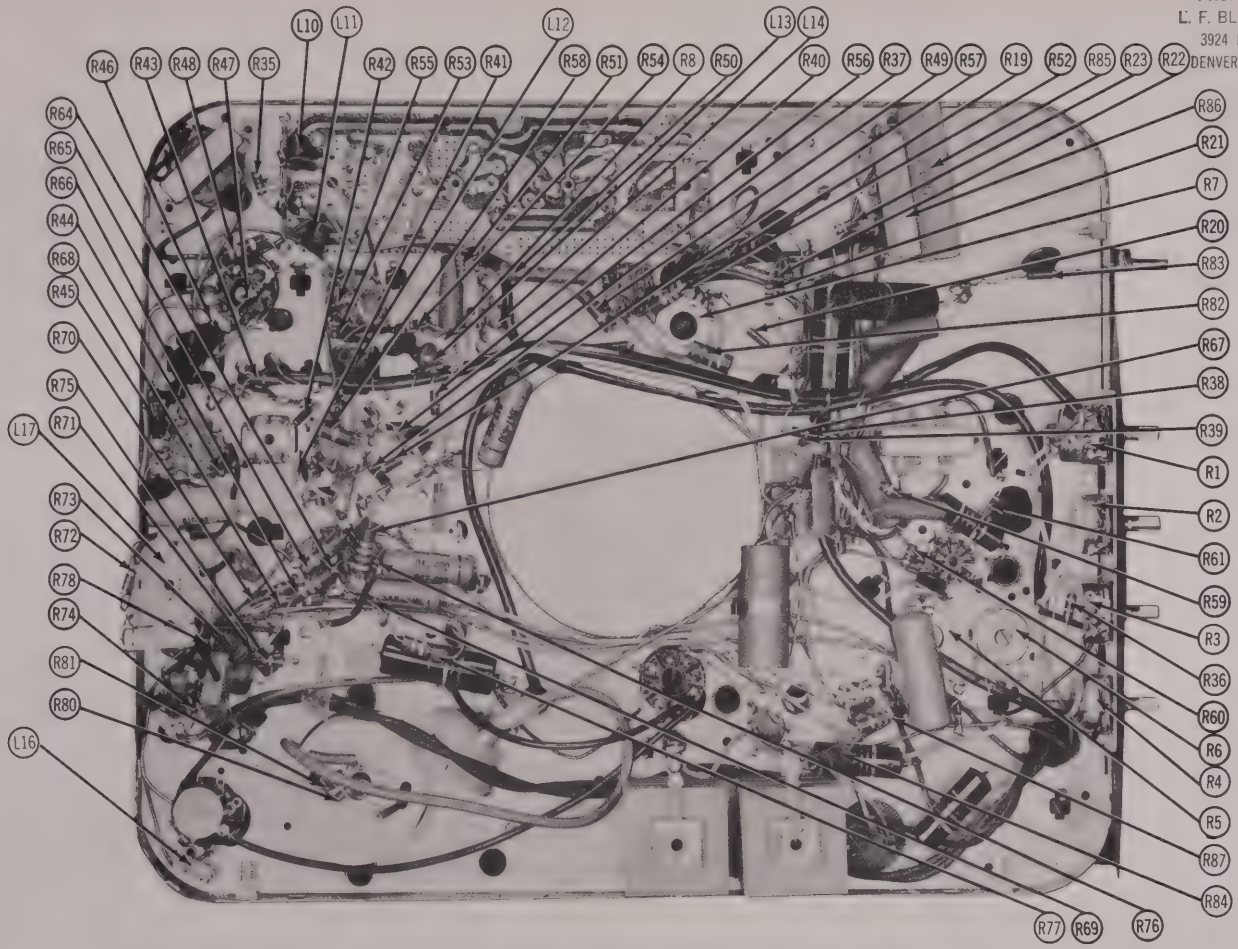


PRINTED BOARD



CHASSIS-TOP VIEW

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE St.
DENVER, COLORADO

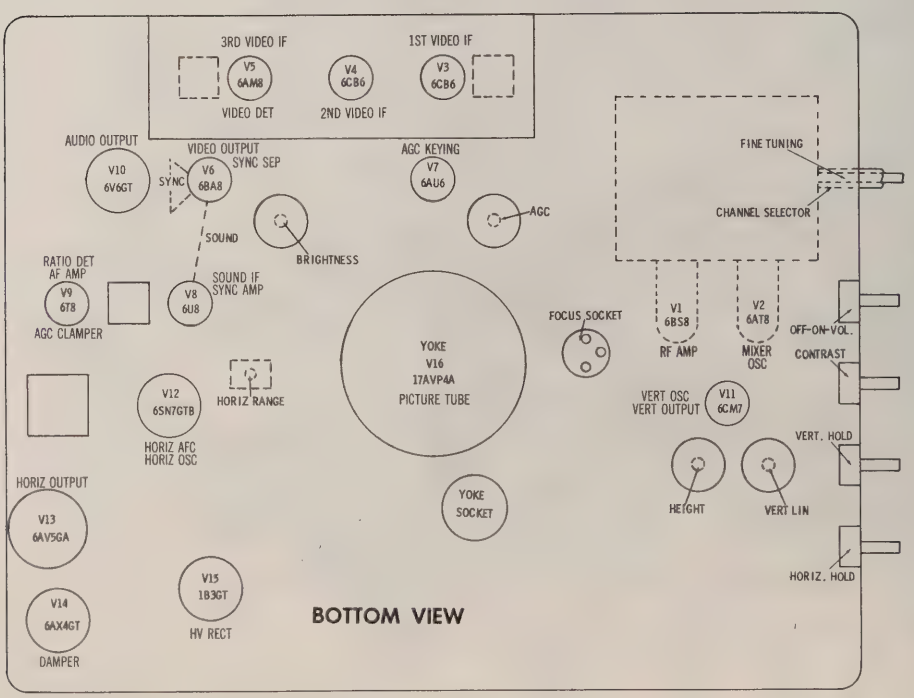


CHASSIS BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION

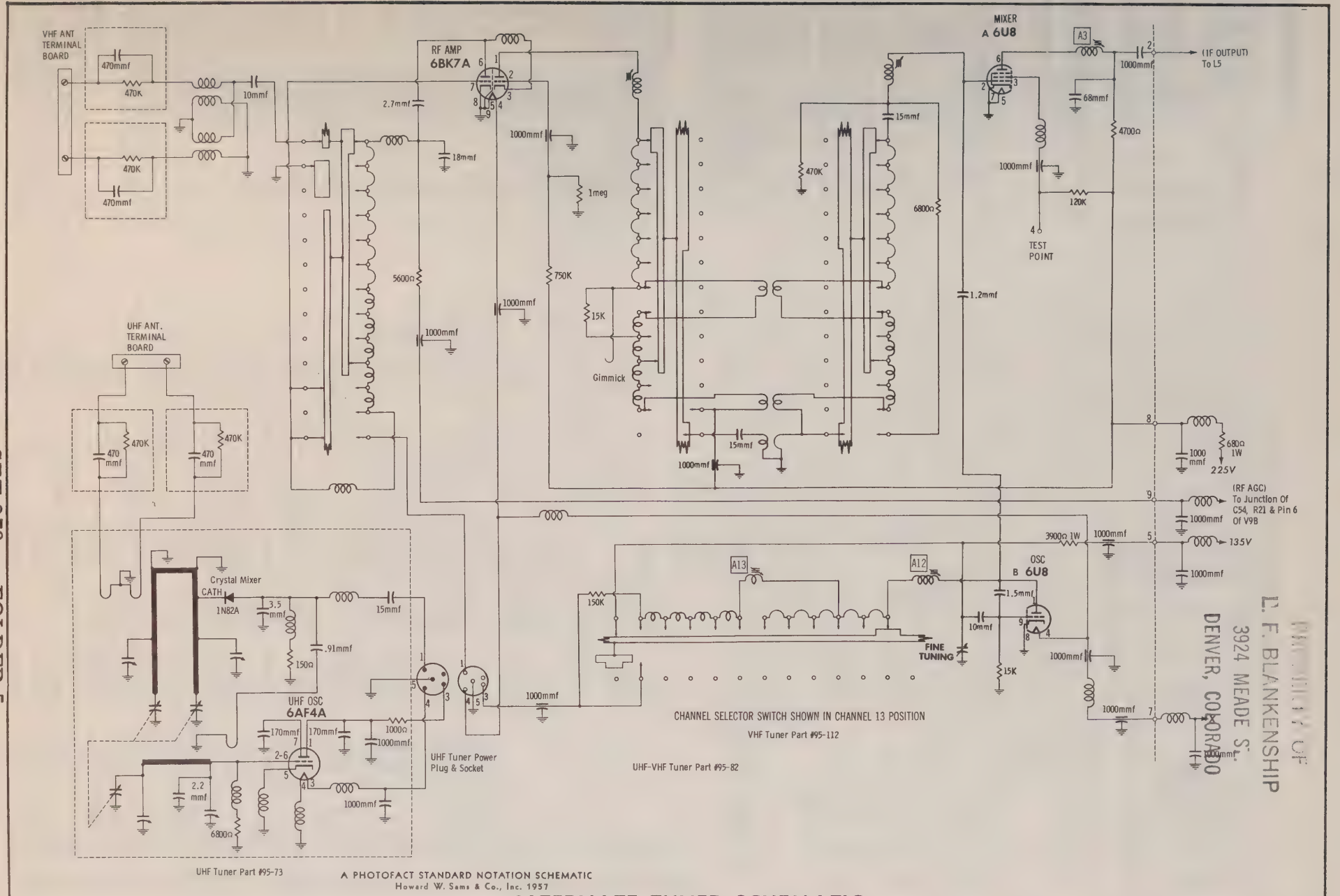
RESISTANCE MEASUREMENTS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6BS8	INF	650K	0Ω	0Ω	.1Ω	†980Ω	480K	INF	0Ω
V2	6AT8	15K	†5900Ω	0Ω	0Ω	.1Ω	†3900Ω	†2100Ω	0Ω	235K
V3	6CB6	45K	56Ω	0Ω	.1Ω	†2400Ω	†2400Ω	0Ω		
V4	6CB6	40K	47Ω	0Ω	.1Ω	†2400Ω	†2400Ω	0Ω		
V5	6AM8	220Ω	.1Ω	†3100Ω	.1Ω	0Ω	†3100Ω	.1Ω	4700Ω	0Ω
V6	6BA8	0Ω	2.2Meg	†680K	0Ω	.1Ω	• 200Ω	4700Ω	†2100Ω	†5000Ω
V7	6AU6	†1800Ω	†650Ω	†650Ω	†650Ω	260K	†47K	†650Ω		
V8	6U8	†6100Ω	3.5Ω	†4300Ω	.1Ω	0Ω	†4300Ω	560Ω	4700Ω	†680K
V9	6T8	INF	18K	INF	0Ω	.1Ω	650K	0Ω	4.7Meg	†270K
V10	6V6GT	NC	0Ω	†1400Ω	†1000Ω	470K	TP	.1Ω	330Ω	
V11	6CM7	‡1700Ω	NC	200Ω	0Ω	.1Ω	• ‡5Meg	• 1.4Meg	1.8Meg	• 2300Ω
V12	6SN7GTB	850K	†30K	290K	240K	†37K	0Ω	0Ω	.1Ω	
V13	6AV5	470K	0Ω	0Ω	NC	‡23Ω	NC	.1Ω	†10K	
V14	6AX4GT	NC	NC	¶	TP	†180Ω	NC	.1Ω	0Ω	
V15	1B3GT		PINS	1 THRU 8	HAVE	INFINITE	RESISTANCE			TOP CAP ‡463Ω
V16	17AVP4A	0Ω	29K	PIN 6 ‡32Ω	PIN 10 ‡32Ω	PIN 11 • 250K	PIN 12 .1Ω			

† MEASURED FROM OUTPUT OF M2.
‡ MEASURED FROM PIN 3 OF V14.
• THIS READING WILL VARY. CONTROL SET FOR NORMAL OPERATION.
¶ THIS READING CAN VARY GREATLY, (10K MINIMUM), DUE TO THE CONDITION OF THE ELECTROLYTIC CAPACITOR CONNECTED IN THE ASSOCIATED CIRCUIT.
NC NO CONNECTION.
TP TIE POINT.



TUBE PLACEMENT CHART



A PHOTOFACT STANDARD NOTATION SCHEMATIC
Howard W. Sams & Co., Inc. 1957

ALTERNATE TUNER SCHEMATIC

SILVERTONE MODELS 7106A, 7107A, 7108A (Ch. 528.49200, 528.49201, 528.49202, 528.49210, 528.49211)

PHOTOFACT OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	R.F. Amplifier	6BE6	
V2	Mixer-Oscillator	6AT6	
V3	1st Video IF Amp	6CB6	
V4	2nd Video IF Amp	6CB6	
V5	3rd Video IF Amp - Video Detector	6AH6	
V6	Video Output-Sync Sep	6DA8	
V7	AGC Keying	6AU6	
V8	Sound IF Amp -Sync Amp	6U8	
V9	Ratio Det.-AGC Clamper-AF Amp.	6T8	
V10	Audio Output	6V6GT	
V11	Vert Osc.-Vert Output	6CM7	
V12	Horiz AFC-Horiz Osc	6SN7GTB	
V13	Horiz. Output	6AV5	
V14	Damper	6AX4GT	
V15	HV Rectifier	1B3GT	

PICTURE TUBE

ITEM No	REPLACEMENT DATA			NOTES
	SILVERTONE PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	
V16	17AVP4A	17AVP4 ②	17AVP4A ③	① Blu-ver screen "66" ② Aluminized
		17ATP4 ②	17ATP4AT	
		17AVP4	17AVP4A1	
			17AVP4	
			17ATP4	
			17AVP4	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP	RATING VOLT	REPLACEMENT DATA SILVERTONE PART No.	AEROVOX PART No.	CORNELL DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.	NOTES
C1A	ea50	150	18-5-6	AFH3B3-75-80	AA2G50	TP1U7		T-050	R3S84 *	
B	a100	50			BR500J	TC250L		MTH-5010		
C2	150	150	18-7-6	AFH3H-33	AA2G15	TP1U7	TM5-35	T-050	TVL-1428	
C3A	a100	300	18-30-3	AFH4-03-50	QO0W1	TP44T		Q-325	R3218 *	
B	a30	300			BR300S	TC68		MTO-3830		
C	30	300								
D	e40	300								
C4	4	50	18-35-0	PR1U50V4	BR84-50	TC30	TD-4-50	MT-0504	TVA-1402	
C5	30	300	18-40-0	WP-PR3300V	BR83035			S-170		
					20					

* Non-catalog item.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP	RATING VOLT	REPLACEMENT DATA SILVERTONE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C6	8					C10V8U				NPO
C7	225									
C8	1.8									
C9	6					C10V6U				NPO
C10	9									
C11	1000			KF-001	MPT-1000					503C-DI
C12	1000			BPD-001	DD-103	BYA6DI	ED-1000	DC52I		503K-DI
C13	1000			EF-001	MFT-1000					503C-DI
C14	1000			EF-001	MFT-1000					503C-DI
C15	1000			EF-001	MFT-1000					503C-DI
C16	.68				TCZ-R68		TCO--68			
C17	.34									
C18	10			BPD-00001	DD-010	LT9QI	GP-10	UC-541	5GA-QI	
C19	2.0					C10V2C				
C20	10									N330
C21	1.6									N330
C22	100									
C23	1000			EF-001	MFT-1000					503C-DI
C24	1000			EF-001	MFT-1000					503C-DI
C25	1000			BPD-001	DD-102	BYA6DI	ED-1000	DC52I	5HK-DI	503E-DI
C26	56									
C27	47	300	18-47X8	PR8BN-47		CUBEP47			6EM-3047	FTM-P47 ①
C28	5000		15-5021	BPD-005	DD-502	BYA10D5	ED-005	DC52S	5HK-D6	① 1% ②
C29	470		15-4711		DD-471	LQT47	ED-470			10% ②
C30	1000		15-1021	BPD-001	DD-102	BYA6DI	ED-1000	DC52I	5HK-DI	
C31	1000		15-1021	BPD-001	DD-102	BYA6DI	ED-1000	DC52I	5HK-DI	
C32	1000		15-1021	BPD-001	DD-102	BYA6DI	ED-1000	DC52I	5HK-DI	
C33	27				TCZ-27	C90Z7C	TCO-27			NPO 10%
C34	680		15-6811		DD-681		ED-680		503K-DI	10% ①
C35	1000		15-1021	BPD-001	DD-102	BYA6DI	ED-1000	DC52I	5HK-DI	
C36	1000		15-1021	BPD-001	DD-102	BYA6DI	ED-1000	DC52I	5HK-DI	
C37	1000		15-1021	BPD-001	DD-102	BYA6DI	ED-1000	DC52I	5HK-DI	
C38	10		15-1001	NPO-81-10	DD-100	LQ9QI	ED-10	ET-541	5TCC-QI	10%
C39	33			BPD-000033	DD-330	LJ0Q33	ED-33	UC-5433	5GA-Q33	
C40	.047	600	18-47X8	PR8BN-47		CUBEP47		GEM-4147	6TM-S47	
C41	.047	600	18-47X8	PR8BN-047		DF-503		GEM-4147	6TM-S47	
C42	.033	600	18-33357							10%
C43	33			BPD-000033	DD-330	LJ0Q33	ED-33	UC-5433	5GA-Q33	
C44	1000		15-1021	BPD-001	DD-102	BYA6DI	ED-1000	DC52I	5HK-DI	
C45	5000		15-5021	BPD-005	DD-502	BYA10D5	ED-005	DC52S	5HK-D6	
C46	560		15-5611		DD-561		ED-560			10%
C47A	4000		20-34-0	BPD-4X004	DD-402	BYC6DE4	E02-004	DCD624	5HK-D4	①
B	4000				DD-402				5HK-D4	
C48	1000		15-1021	BPD-001	DD-102	BYA6DI	ED-1000	DC52I	5HK-DI	
C49	5000		15-5021	BPD-005	DD-502	BYA10D5	ED-005	DC52S	5HK-D6	
C50	5000		15-5021	BPD-005	DD-502	BYA10D5	ED-005	DC52S	5HK-D6	
C51	1000		15-1021	BPD-001	DD-102	BYA6DI	ED-1000	DC52I	5HK-DI	
C52	5000		15-5021	BPD-005	DD-502	BYA10D5	ED-005	DC52S	5HK-D6	
C53	1000	2000	15-10208		DD20-102	HVB20DI			20GA-DI	
C54	.047	600	18-47X8	PR8BN-047		DF-503		GEM-4147	6TM-S47	
C55	22	200	18-22X8	PR8BN-22		CUBEP22		GEM-3022	6TM-P22	
C56	5000		15-5021	BPD-005	DD-502	BYA10D5	ED-005	DC52S	5HK-D6	
C57	.022	600	18-23X8	P48BN-022	DD-223	CUB4322	ED-02	GEM-4122	6TM-S22	
C58	180		15-18214	NT60-S1150	TCN-150	C10T1SU	TCT-150		STCU-T15	10% NT60
C59	.0047	600	18-47257							10%
C60	5000		15-5021	BPD-005	DD-502	BYA10D5	ED-005	DC52S	5HK-D6	
C61	.047	600	20-447-1	P48BN-047	DF-503	CUB4547		GEM-4147	6TM-S47	
C62	.1	600	30-4-1	P58BN-1	DF-104	CUB6P1		GEM-601	6TM-P1	
C63	.047	300	18-47Z8	P28BN-047	DF-503	CUB4247		GEM-4147	6TM-D47	
C64	180		17-18119	1469-00018		2SRS7I6			MS-S18	10%
C65	25-250		19-252-0							
C66	3000		15-30216	BPD-0022	DD-202	BYA10D2	ED-002	DC522	5HK-D2	
C67	.047	600	18-47X8	P48BN-047	DF-503	CUB4547		GEM-4147	6TM-S47	
C68	.33	300	18-33X8	P28BN-33		CUBEP33		GEM-3033	6TM-P33	
C69	.047	600	18-23237							10%
C70	390		17-18119	1469-00039		2SRST39			MS-S39	10%
C71	.01	600	30-19-1	P68BN-01	DD-103	CUB681	GP-1000	GEM-611	6TM-S1	

PARTS LIST AND DESCRIPTIONS

CAPACITORS (cont)

ITEM No.	RATING CAP	RATING VOLT	REPLACEMENT DATA SILVERTONE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C72	1000		17-10119	1484-001		1RS01			MS-S1	10%
C73	.0047	600	18-47257							10%
C74	100		15-10111							10% N1400
C75	47		15-47011	NPO-S147	TCZ 47	C10Q47C	TCO-47	Z7-5447	5TCU-Q47	10% NPO
C76	047	400	15-47348	P488N-047	DF 503	CUB4547		GEM-4147	6TM-S47	
C77	100	4000	15-10148							10% N1400
C78	68	5000								5%
C79	047	600	30-947-1	P88N-047	DF-503	CUB6547		GEM-6147	6TM-S47	①
C80	047	600	30-947-1	P68BN-047	DF-503	CUB6547		GEM-6147	6TM-S47	①
C81	5000	1000	30-17-0							
		VAC								
C82	5000			BPD 005	DD 502	BYA10D5	ED 005	DC52S	5HK-D6	

① In some versions this is one-half of a dual 1000MMF (Part #15-10218).
② Some versions use a 1500MMF in this application (Part #15-15211).
③ Not used in some versions.
④ Some versions may use a dual 5000MMF in this application (Part #15-50218)
⑤ Not used in Ch. 528 49200 and 528 49210.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA SILVERTONE PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500K	½	34-231	B-50	A47-500K-S	Q33-133	U48	Volume
B	Shaft			Not Req.	KBS-3	Not Req.	Not Req.	
C	Switch			KB-1	SWE-12	76-1	U8-38	
R2A	300Ω	½	35-41	B-3	A47-300-S	Q31-301	U3	Contrast
B	Shaft			Not Req.	KBS-3	Not Req.	Not Req.	
R3A	1.5Meg	½	34-363	B-763	A47-1.5Meg-S	Q31-158	U156	Vert. Hold - Note 1
B	Shaft			Not Req.	KBS-3	Not Req.	Not Req.	
R4A	100K	½	35-94	B-40	A47-100K-S	Q31-138	U41	Horiz. Hold
B	Shaft			Not Req.	KBS-3	Not Req.	Not Req.	
R5A	3000Ω	½	35-93	A5-3	A47-4000-S ④	Q31-34 †	PTA521, †	Vert. Lin. with 1800Ω stop
B	Shaft			AK-19	RN-3	TQ	Not Req.	
R6A	5Meg	1	25-51	AB-56 *	A47-4Meg-S ⑤	Q1-141 *	PTA5L *	Height with 1.2Meg stop - Note 3
B	Shaft			AK-19	RN-3	TQ	Not Req.	
R7A	5Meg	½	35-58	AB-59	A47-5Meg-S	Q1-141	PTA6L	AGC
B	Shaft			AK-19	RN-3	TQ	Not Req.	
R8A	100K	1	25-40	A5-40	A47-100K-S	Q1-128	PTA1L	Brightness
B	Shaft			AK-19	RN-3	TQ	Not Req.	

† Use 1500Ω resistor in series with right hand terminal
* Use 1Meg resistor in series with right hand terminal
Note 1. Chassis 528.49220 and 528.49211 use alternate part #15-343 in this application.
Note 3. In some versions a 2.7Meg control with a 1.2Meg stop will be used in this application.
To replace use replacements listed and a 1.4Meg resistor to replace R5G.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA SILVERTONE PART No.	IRC PART No.	NOTES
R9	2200Ω		106-223	BTS-2200	
R10	3300Ω		106-333	BTS-3300	
R11	330K		106-334	BTS-330K	
R12	1.2Meg		106-125	BTS-1.2Meg	
R13	15K		106-153	BTS-15K	
R14	220K		111-334	BTS-330K	
R15	1800Ω		106-182	BTS-1800	
R16	5600Ω		106-562	BTS-5600	
R17	15K		106-153	BTS-1500	
R18	330K		106-334	BTS-330K	Note 1
R19	330Ω		60-33101	BTS-330	Note 3
R20	2.2Meg		60-22501	BTS-2.2Meg	
R21	470K		60-47401	BTS-470K	
R22	22K		60-22302	BTS-22K	
R23	220K		60-22401	BTS-220K	
R24	39K		60-39301	BTS-39K	
R25	1800Ω		60-56201		
R26	330Ω		60-33101	BTS-330	
R27	56Ω		60-56001	BTS-56	Note 3
R28	13K		60-13201		Note 4
R29	1000Ω		60-10302	BTS-1000	
R30	330Ω		60-33101	BTS-330	
R31	47Ω		60-47001	BTS-47	
R32	47K		60-47301		Note 5
R33	1000Ω		60-10302	BTS-1000	
R34	330Ω		60-33101	BTS-330	
R35	100Ω		60-10001		
R36	18Ω		60-18001	BTS-18	
R37	2200Ω		60-22302	BTS-2200	
R38	22K		60-22302	BTS-22K	
R39	5600Ω		60-56201	BTS-5600	
R40	220K		60-22401	BTS-220K	
R41	560Ω		60-56101	BTS-560	
R42	220Ω		60-22201	BTS-220	
R43	22K		60-22302	BTS-22K	
R44	18K		60-18301	BTS-18K	
R45	4.7Meg		60-47502	BTS-4.7Meg	
R46	270K		60-27401	BTS-270K	
R47	470K		60-47401	BTS-470K	
R48	330Ω	1	60-33111	BTA-330	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA SILVERTONE PART No.	IRC PART No.	NOTES
R49	1200Ω	1	60-12211	BTA-1200	
R50	3300Ω	4	61-30		
R51	33K		60-33301	BTS-33K	
R52	47K	1	60-47311	BTA-47K	
R53	2.2Meg		60-22501	BTS-2.2Meg	
R54	270K		60-27401	BTS-270K	
R55	680K		60-68401	BTS-680K	
R56	1800Ω		60-18301	BTS-1800	
R57	3300Ω		60-33301	BTS-3300	
R58	47001	1	60-47311	BTA-4700	
R59	820K		60-82401		
R60	1.5Meg		60-15501		
R61	560Ω		60-56101		
R62	82Ω		60-82001		
R63	100Ω		60-10001		
R64	820K		60-82401		
R65	2.7Meg	1	60-27511		
R66	56K	1	60-56311		
R67	47K	1	60-47311		
R68	150K	1	60-15411	BTA-150K	
R69	8200Ω		60-82201	BTS-8200	
R70	100K	1	60-10411	BTA-100K	
R71	150K	1	60-15411	BTA-150K	
R72	8200Ω		60-82201		
R73	39K	1	60-39311	BTA-39K	
R74	470K		60-47401	BTS-470K	
R75	150K		60-15401	BTS-150K	
R76	10K		60-10301	BTS-10K	
R77	100K		60-10401	BTS-100K	
R78	10K	2	60-10321	BTH-10K	
R79	1000Ω			BTS 1000	
R80	2.7Ω		60-27901	BTS-2.7	
R81	4700Ω		60-47201	BTS-4700	
R82	22K	2	60-22321	BTS-22K	
R83	2.2Meg		60-22501	BTS-2.2Meg	
R84	10001	2	60-10222	BTH-1000	
R85	21000	15	61-77		
R86	1800	10	61-53		
R87	4700	1	60-47111	BTA-470	
R88	4.5Ω	10	61-113		Note 6

Note 1. Some versions use a 220K in this application.
Note 3. Some versions use a 680Ω, 1W in this application.
Note 3. Some versions use a 47Ω in this application.
Note 4. Some versions use a 18K across the primary and omit the resistor across the secondary.
Note 5 Some versions use a 56K in this application
Note 6. In versions not using a circuit breaker this resistor becomes a 5Ω flexible resistor (Part #43-1009 or 43-1011).

TRANSFORMER (FILAMENT)

ITEM No.	PRI	SEC 1	SEC 2	SEC 3	REPLACEMENT DATA SILVERTONE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No
T1	117VAC	6.3V	6.3V		80-396		P-3082			
	① .33A	② .3A	③ 7.9A							

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA SILVERTONE PART No	Halldorson PART No	Merit PART No	Ram PART No	Stancor PART No	Thordarson PART No	Triad PART No	NOTES
T2	Vert. Osc.	B80-320-A	B6702	A-3032	V406	A-8126	A-97X	28A03	
T3	Vert. Output	B80-325	Z1806 ①	A-3039 ①	V313 ②	A-8146 ①	26S54 ①	A-104X	
T4A	Yoke-Horiz (20 SMH	10-8147 ②	TCF07	MDF-91	Y90781/43	DY-16	Y-16	Y-41 ④	
B	(80°)-Vert (39MH)	2 ④ 5	2 ④ 5	2 ④ 5	2 ④ 5	2 ④ 5	2 ④ 5	NW3 ④ 5	
	All. Yoke	10-815 ③							
T5	Horiz. Output	B80-375G		RVO-138	X144 *	HO-574 *	FLY-137 *		
	All. Horiz. Output	80-375		RVO-138	X144 *	HO-574 *	FLY-137 *		

① Drill new mounting hole(s).
② Includes yoke plug part #45-166, rear cover and centering device #83-326 or #83-1034.
③ Use original horizontal damping network, if necessary.
④ Jumper yoke terminals #6 and #1, connect to yoke plug pin #5 Connect yoke terminal #3 to yoke plug pin #7, yoke terminal #4 to yoke plug #3.
⑤ Use original rear cover and centering device and width sleeve

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
4			4	4	4		
3			3	3	3		
2			2	2	2		
1			1	1	1		
A			A	G	A		
G			G	A	G		

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA SILVERTONE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T6	8600Ω	3-4Ω	80-379	Z1107 ①	A-3026	A-8877 ①	24S51 ①	S-6X	① Drill new mounting hole

SPEAKER

ITEM No.	TYPE SIZE	TYPE FIELD	TYPE V. C. IMP.	REPLACEMENT DATA SILVERTONE PART No.	REPLACEMENT DATA QUAM PART No.	NOTES
SP1	5"	PM	3-4Ω	79-438	5A0T	

COILS (RF-IF)

ITEM No.	USE	SILVERTONE PART No.	NOTES
L1	Ant. Trans.	2366-1	
L2	Osc. Coil	2366-4	Channel 8
L3	Osc. Coil	2366-3	Channel 13

ITEM No.	USE	SILVERTONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L5	1st. Video IF	10-39-2				Includes 4. 25MC Trap - Note 1
L6	2nd. Video IF	10-4-3				Include 47. 25MC Trap - Note 3
L7	3rd. Video IF	10-5-3				Note 3
L8	4th Video IF	10-38-2				Includes Cap
L9	Resonat Choke	10-55-1				13 Microhenries
L10	Series Peaking Coil	10-12-1	19-3125	TV-196	6153	120 Microhenries
L11	Shunt Peaking Coil	10-36-1	19-3250	TV-185	6150	269 Microhenries
L12A	4.5MC Trap	10-61-1		TV-131		Note 4
B	Sound IF				6154 *	
L13	Series Peaking Coil	10-10-1	19-4201 *			220 Microhenries, wound on 22K resistor
L14	Shunt Peaking Coil	10-67-1	19-4201		6154	220 Microhenries
L15	Ratio Det	10-3-0	17-3498	TV-115	6205	Note 3
L16	R.F Choke	33-368				4.7 Microhenries, IRC part #CL4

* Parallel 22K resistor.
Note 1. Some versions may use part #10-5-2 or 10-35-3.
Note 2. Alternate part #10-9-2
Note 3 Alternate part #10-10-3
Note 4 Alternate part #10-11-0, 10-11-1, or 10-11-1
Note 5 Alternate part #10-26-1.

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES PRI.	DC RES SEC.	REPLACEMENT DATA SILVERTONE PART No	Halldorson PART No	Merit PART No	RCA TYPE No	Ram PART No	Thordarson PART No	NOTES
L17	70Ω *		10-18-1	20-1402 ▲	TV-183 ▲	6183 ▲	20S21 ▲	H-100 ▲	HS-3 ▲

* Tapped @ 50Ω, waveform coil 40Ω.
▲ Reverse coil mounting in can.

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	SILVERTONE PART No	REPLACEMENT DATA
K1	Vert Integrator	2000MMF, 5000MMF, 5000MMF, 33K, 8200Ω, 820Ω	13-2-0	Aerovox PA-501 Centralab PC-104 Cornell-Dubilier 1ST7M2 Erie 1405-01 Sprague 103C13

SILVERTONE MODELS 7106A, 7107A, 7108A (Ch.528.49200, 528.49201, 528.49202, 528.49210, 528.49211)

FOLDER 5

PARTS LIST AND DESCRIPTIONS (Continued)

RECTIFIERS

ITEM No.	RATING	REPLACEMENT DATA					NOTES
	CURRENT (Measured)	SILVERTONE PART No.	FEDERAL PART No.	GENERAL ELECTRIC PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	
M1	.260A	83-829 ①	1090A ①	1N1007 ②	RS300SL ①	300 ①	① Selenium type.
M2	.260A	83-829 ①	1090A ①	1N1007 ②	RS300SL ①	300 ①	② Germanium type.

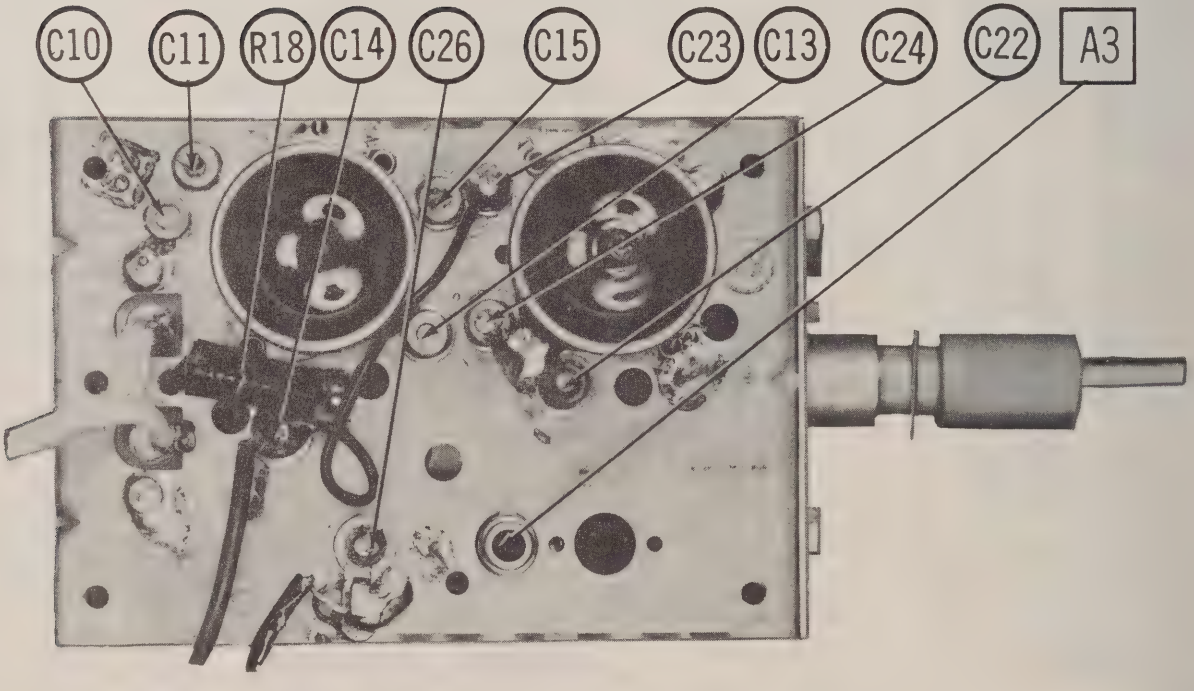
MISCELLANEOUS

ITEM No.	PART NAME	SILVERTONE PART No.	NOTES
M3	Pilot Light	89-7	Type #47 - Not used in all versions
M4	Circuit Breaker	43-1-2	Reset Type - Not used in all versions
M5	Tuner	95-75	VHF
	Tuner	95-82	UHF-VHF - Includes UHF Tuner #95-73 and VHF Tuner #95-112
M6	Width Device	83-962	
M7	Centering Device	83-936	Includes yoke rear cover
	Centering Device	83-1034	Includes yoke rear cover
M8	Ion Trap	83-830	
	Printed Board	D13-2-4	Video IF

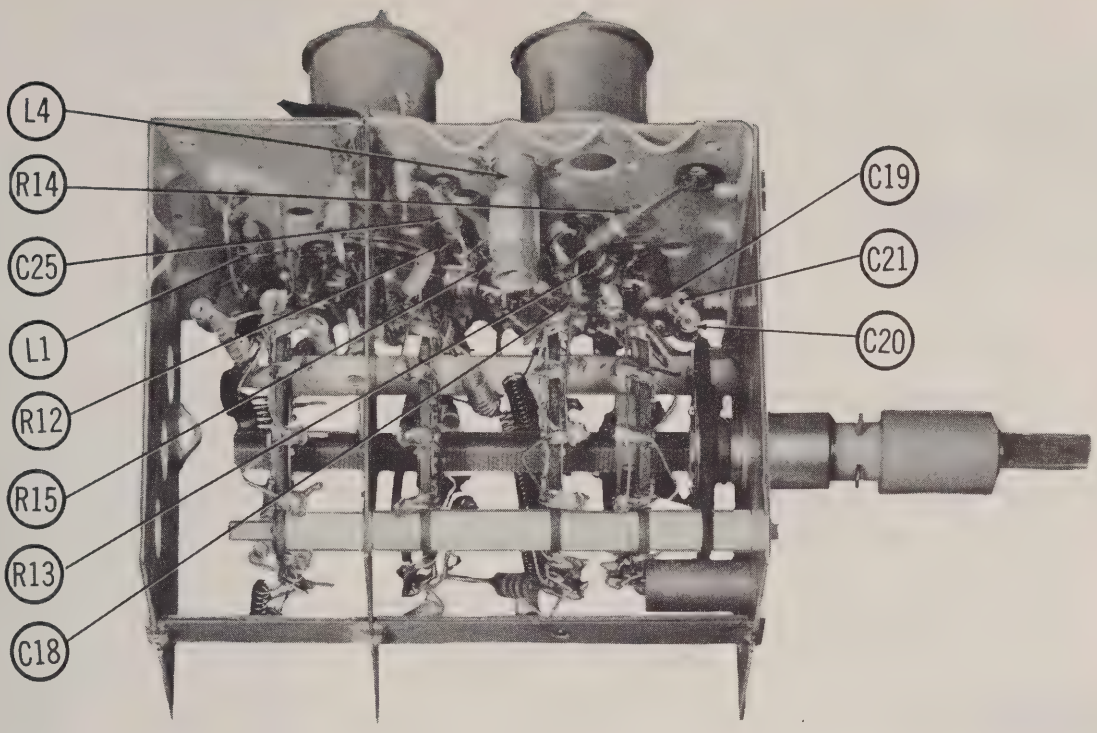
CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

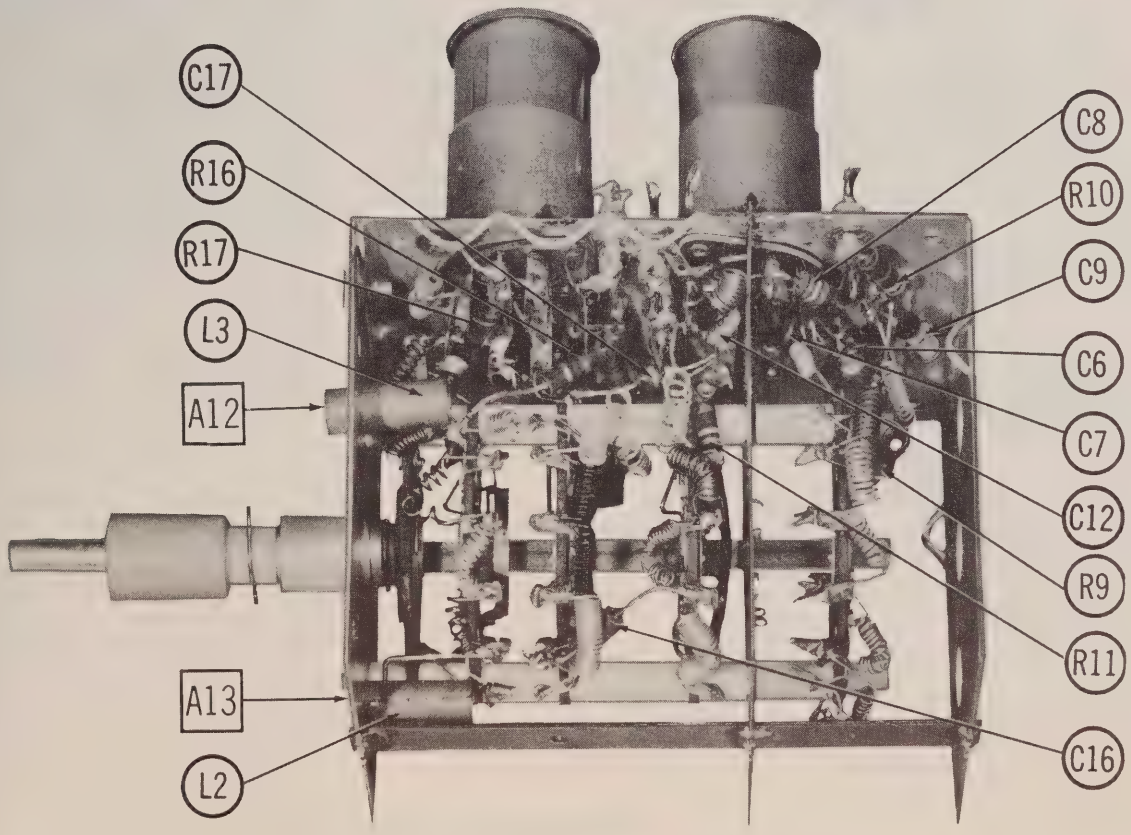
NAME	PART NO.	DESCRIPTION
Safety Glass	48-102	
Mask	31-311	
Bezel	40-302	Channel Indicator & Mirror
Knob	52-630	VHF Channel Indicator - Models 7106A, 7108A
Knob	52-595	Fine Tuning - Models 7106A, 7108A UHF Channel Selector - Model 7107A
Knob	52-631	VHF Channel Selector - Model 7107A
Knob	52-588	VHF Fine Tuning - Model 7107A
Knob	52-633	Brightness
Knob	52-575	Aux. Controls (4 used)
Dial	52-590	UHF Channel Indicator - Model 7107A
Cabinet	42-842	Models 7106A, 7107A
Cabinet	42-843	Model 7108A



RF TUNER TOP VIEW

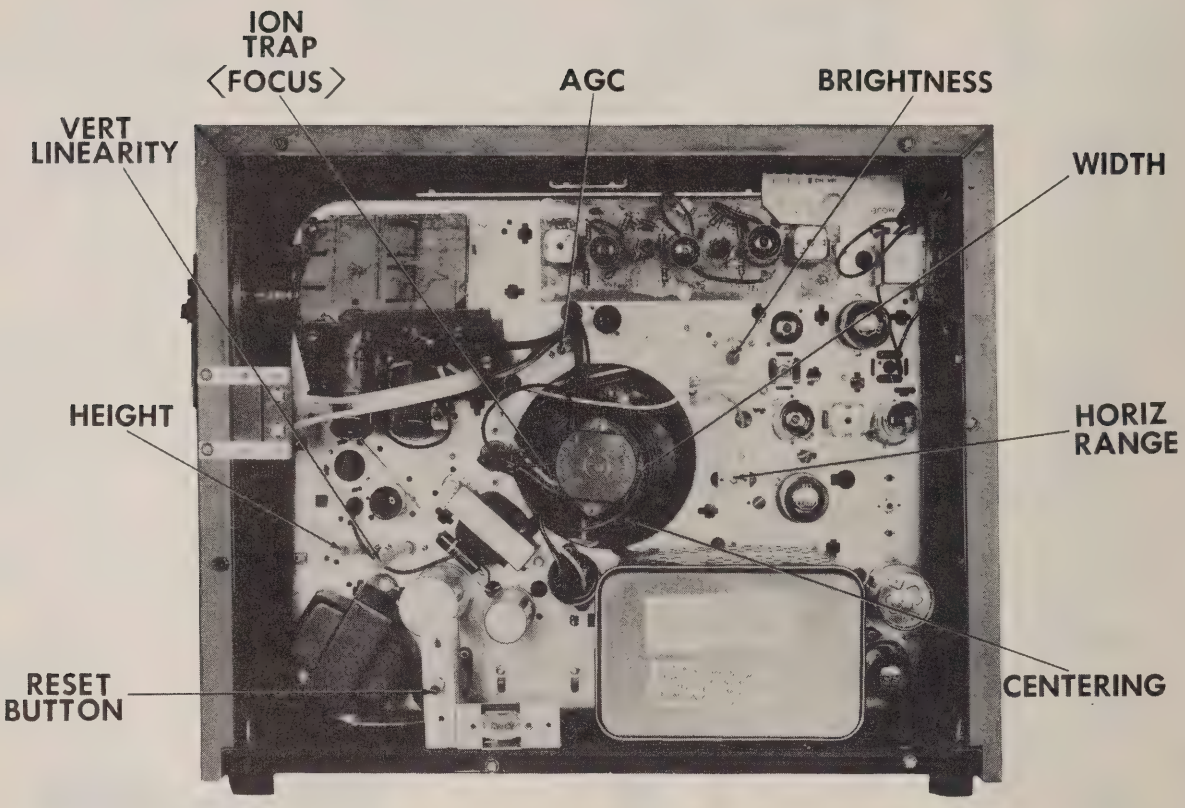


RF TUNER-LEFT SIDE



RF TUNER-RIGHT SIDE

FOLDER 5



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

HORIZONTAL FREQUENCY ADJUSTMENT

1. Turn the horizontal range trimmer (B3) fully clockwise.
2. Tune in a station and adjust the horizontal hold control until the picture synchronizes horizontally. If the picture cannot be synchronized with the horizontal hold control, set it to the center of its range and adjust the horizontal frequency slug (B1) until the picture synchronizes horizontally.
3. If step 2 is not successful, turn the horizontal waveform slug (B2) several turns clockwise from the rear. Readjust B1 until the picture synchronizes horizontally.

HORIZONTAL WAVEFORM ADJUSTMENT

Connect the vertical amplifier of an oscilloscope thru a low capacity probe to terminal "C" of L17. If necessary, adjust the horizontal waveform slug (B2) for a waveform similar to Fig. 2 with the sharp peak approximately 10% higher in amplitude than the rounded peak. Keep the picture in sync during this adjustment with the horizontal hold control or B1. Remove the scope connection.

HORIZONTAL RANGE TRIMMER ADJUSTMENT

1. Turn the horizontal hold control fully counter clockwise. Turn the horizontal range trimmer (B3) fully clockwise, then back 1/4 turn counter clockwise. Turn B1 counter clockwise until the picture is displaced to the right. Turn B1 clockwise until the picture just locks in sync.
2. Set the horizontal hold control fully clockwise. Momentarily switch off channel and back again; the picture should lose sync. Turn the horizontal hold control slowly counter clockwise and note the number of diagonal bars present just before the picture falls into sync. If less than two diagonal bars are visible, turn B3 SLIGHTLY counter clockwise. If more than three diagonal bars are visible, turn B3 SLIGHTLY clockwise. Repeat steps 1 and 2, if necessary.
3. Normal position of the range trimmer (B3) is 1/4 turn from full clockwise.

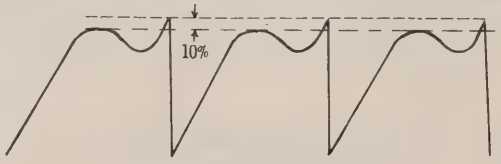


FIG. 2

PHOTOFACT* Folder

*TRADE MARK

DAVID BOGEN
MODELS ST-10, ST-10G

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

DAVID BOGEN
MODELS ST-10, ST-10G

MODEL ST-10

DAVID BOGEN
MODELS ST-10, ST-10G

TRADE NAME	David Bogen Models ST-10, ST-10G
MANUFACTURER	David Bogen Co., Inc., P. O. Box 500, Paramus, N. J.
TYPE SET	AC Operated Audio Amplifier
TUBES (Seven)	Types ECC83/12AX7 (or) 12AD7 Ch. 2 Preamplifier, 6C4 Ch. 2 Cathode Follower, ECC83/12AX7 (or) 12AD7 Ch. 1 Preamplifier, 6U8 Ch. 1 AF Amp.-Phase Inv., (2) 6AQ5 Ch. 1 Output, EZ80/6V4 (or) EZ81/6BW4 Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING .52 Amp. @ 117 Volts AC (52 Watts)

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1957 Howard W. Sams & Co., Inc., Indianapolis 5, Indiana. Printed in U.S. of America

PARTS LIST AND DESCRIPTIONS

DAVID BOGEN
MODEL ST-10

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Ch. 2 Preamplifier	ECC83/ 12AX7	Note 1
V2	Ch. 2 Cathode Follower	6C4	
V3	Ch. 1 Preamplifier	ECC83/ 12AX7	Note 1
V4	Ch. 1 AF Amp. - Phase Inv.	6U8	
V5	Ch. 1 Output	6AQ5	
V6	Ch. 1 Output	6AQ5	
V7	Rectifier	EZ80/ 6V4	Note 2

Note 1. Type 12AD7 may be used in some versions.
Note 2. Type EZ81/6BW4 may be used in some versions.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	David Bogen PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	▲30	350		AFH4-49	D0080 BR3035				
B	■5	350							
C	▲5	350							
D	10	25							
C2	8	250	①	PRS250V8	BBR8-250	TC51	TD-8-250	MT-2508	TVA-1503

① Some versions may use 20MFD in this application.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

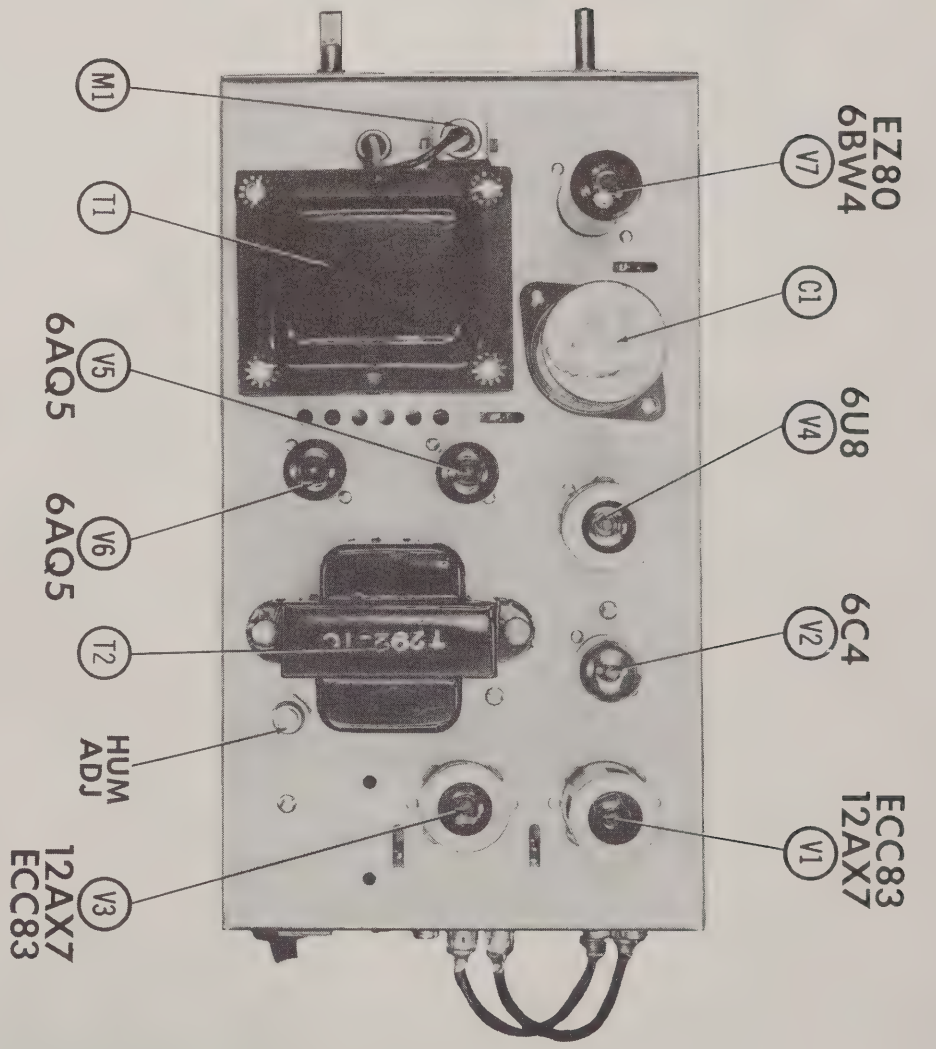
ITEM No.	RATING CAP.	RATING VOLT	David Bogen PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C3	.022	200		P288N-022	DD-203	CUB4S22	ED-02	GEM-4122	2TM-S22	
C4	.022	200		P288N-022	DD-203	CUB4S22	ED-02	GEM-4122	2TM-S22	
C5	270			BPD-00027	DD-271	L10T27	ED-270	UC-5327	5GA-T27	
C6	.033	200		P288N-033	DF-303	CUB6S33		GEM-4133	6TM-S33	
C7	.1	200		P288N-1	DF-104	CUB2P1		GEM-201	2TM-P1	
C8	.022	200		P288N-022	DD-203	CUB4S22	ED-02	GEM-4122	2TM-S22	
C9	.022	200		P288N-022	DD-203	CUB4S22	ED-02	GEM-4122	2TM-S22	
C10	270			BPD-00027	DD-271	L10T27	ED-270	UC-5327	5GA-T27	
C11	.033	200		P288N-033	DF-303	CUB6S33		GEM-4133	6TM-S33	
C12	.0022	200		P288N-0022	D6-222	CUB6D22	GP-2200	GEM-6222	6TM-D22	
C13	.033	200		BPD-033	DF-303	CUB6S33		GEM-4133	6TM-S33	
C14	.022	400		P488N-022	DD-203	CUB4S22	ED-02	GEM-4122	4TM-S22	①
C15	680			BPD-00068	DD-681	BYA10T68	ED-680	UC-5368	5GA-T68	②
C16	68			BPD-000068	DD-680	L10Q68	ED-68	UC-5468	5GA-Q68	③
C17	15000			BPD-015	DD16-153	BYA10S15	ED-015		5HK-S15	
C18	15000			BPD-015	DD16-153	BYA10S15	ED-015		5HK-S15	
C19	1000			BPD-001	DD-102	BYA6D1	ED-1000	DC521	5HK-D1	③

① Some versions may use .033MFD in this application.
② Some versions may use 270MMF in this application.
③ Not used in some versions.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	David Bogen PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500K	½	V41A	BB-104	AD47-500K-2	Q13-133	UE1402	Volume
B	500K	½		Not Req.	Not Req.	M13-133	Not Req.	Volume
C	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
R2A	500K	½	V323A	B-60	A47-500K-S	Q13-133	U48	Treble
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
C	Switch			KB-1	SWE-12	76-1	US-26	
D	Cover			KB-5				
R3A	50Ω	2	V113A	WN-500	A43-50	WPK50	R50L	Hum Balance (Wire Wound)
B	Shaft			Not Req.	FKS-1/4	Not Req.	Not Req.	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	David Bogen PART No.	IRC PART No.	
R4	100K			BTS-100K	
R5	3.3Meg			BTS-3.3Meg	
R6	220K			BTS-220K	
R7	180K			BTS-180K	
R8	3.3Meg			BTS-3.3Meg	
R9	220K			BTS-220K	
R10	47K			BTS-47K	
R11	100K			BTS-100K	
R12	3.3Meg			BTS-3.3Meg	
R13	220K			BTS-220K	
R14	180K			BTS-180K	
R15	3.3Meg			BTS-3.3Meg	
R16	220K			BTS-220K	
R17	150K			BTS-150K	Note 1
R18	47K			BTS-47K	
R19	470K			BTS-470K	
R20	390K			BTS-390K	
R21	390Ω			BTS-390	
R22	100K			BTS-100K	
R23	6800Ω			BTS-6800	Note 2
R24	150K			BTS-150K	Note 3
R25	22K			BTS-22K	Note 4
R26	110K 5%			BTS-110K 5%	Note 5
R27	22K			BTS-22K	
R28	680K			BTS-680K	
R29	1200Ω	1		BTA-1200	Note 6
R30	300Ω	7		PW7-300	
R31	680K			BTS-680K	
R32	2200Ω	2		BTB-2200	
R33	.47Ω	1		BTA-.47	
R34	.47Ω	1		BTA-.47	
R35	.27Ω 5%	1		BTA-.27 5%	
R36	.27Ω 5%	1		BTA-.27 5%	

Note 1. Some versions may use 100K in this application.
Note 2. Some versions may use 22K in this application.
Note 3. Some versions may use 110K in this application.
Note 4. Some versions may use 33K in this application.
Note 5. Some versions may use 82K in this application.
Note 6. Not used in some versions.

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	David Bogen PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @ .52A	580VCT @ .068A	6.3VAC @ 2.6A		T3174 ①				22R02 ②	R-5B

① Alternate Part #T3159

② Tape 5V@ 2A winding and center tap on 6.3V winding.

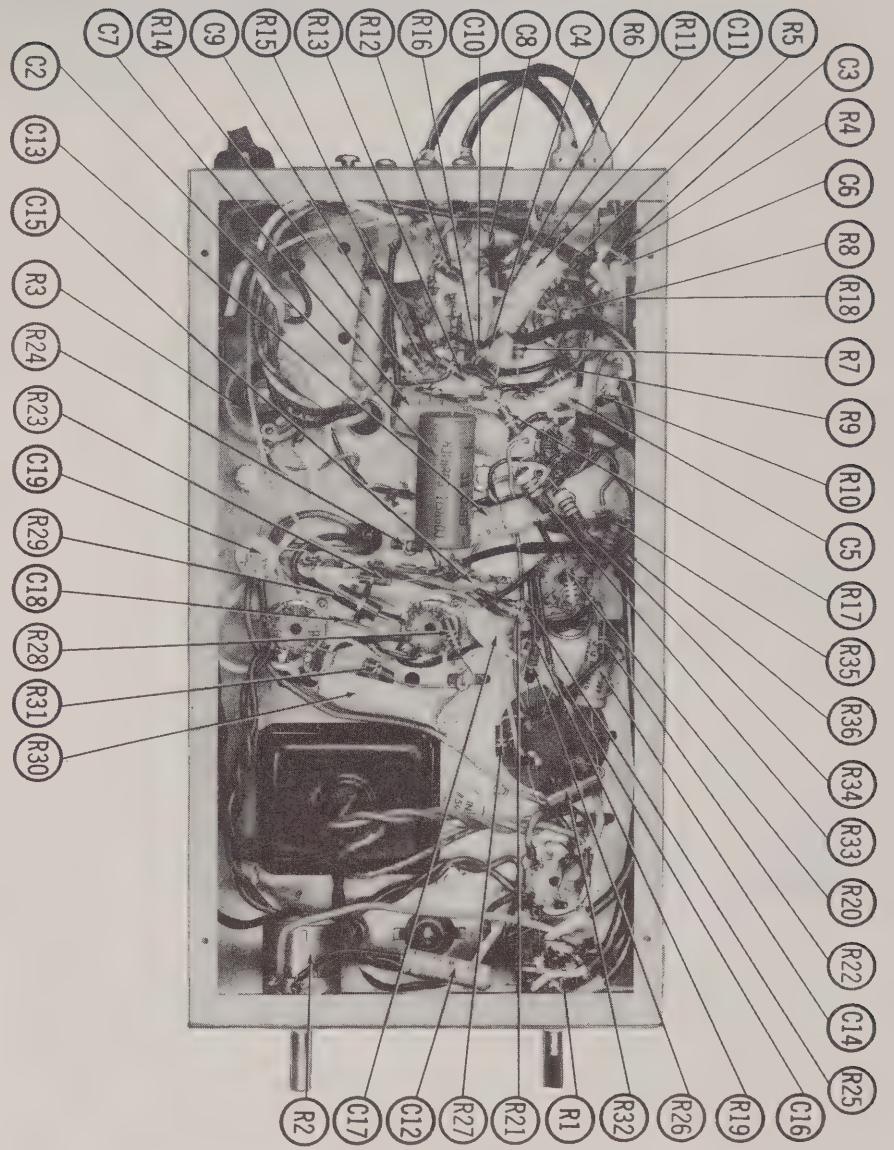
TRANSFORMER (AUDIO OUTPUT)

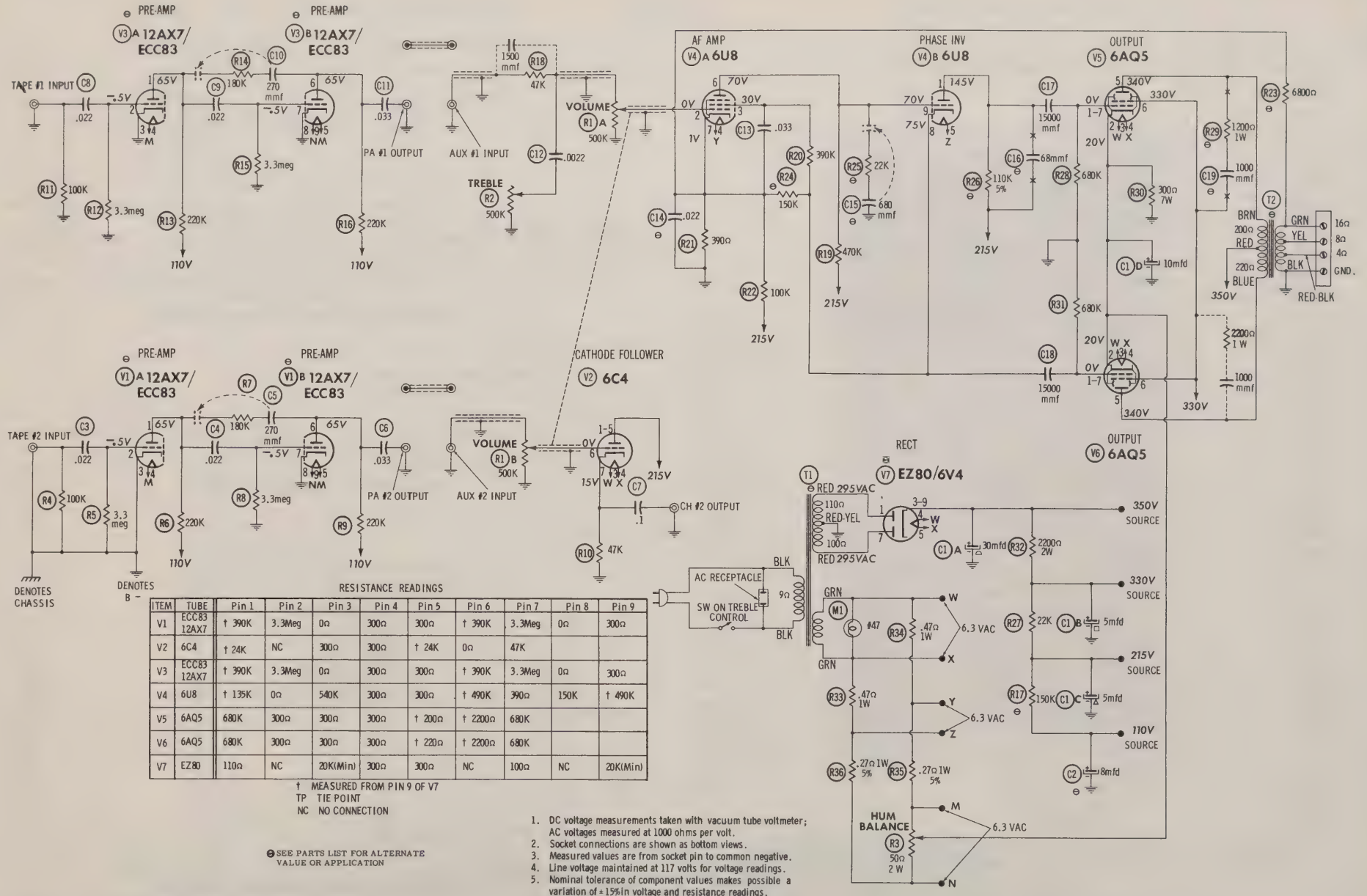
ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	David Bogen PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	7800Ω CT	16Ω Tap@ 8Ω, 4Ω	T292-1	Z1112	A-3027			S-28X	① Alternate Part Number ② Drill new mounting hole
	3600Ω CT	16Ω Tap@ 8Ω, 4Ω	T292-3 ①	Z1404 ②		A-3870	26S59		

MISCELLANEOUS

ITEM No.	PART NAME	David Bogen PART No.	NOTES
M1	Pilot Light		#47

CHASSIS—BOTTOM VIEW





RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	ECC83 12AX7	† 390K	3.3Meg	0Ω	300Ω	300Ω	† 390K	3.3Meg	0Ω	300Ω
V2	6C4	† 24K	NC	300Ω	300Ω	† 24K	0Ω	47K		
V3	ECC83 12AX7	† 390K	3.3Meg	0Ω	300Ω	300Ω	† 390K	3.3Meg	0Ω	300Ω
V4	6U8	† 135K	0Ω	540K	300Ω	300Ω	† 490K	390Ω	150K	† 490K
V5	6AQ5	680K	300Ω	300Ω	300Ω	† 200Ω	† 2200Ω	680K		
V6	6AQ5	680K	300Ω	300Ω	300Ω	† 220Ω	† 2200Ω	680K		
V7	EZ80	110Ω	NC	20K(Min)	300Ω	300Ω	NC	100Ω	NC	20K(Min)

† MEASURED FROM PIN 9 OF V7
TP TIE POINT
NC NO CONNECTION

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
Howard W. Sams & Co., Inc. 1957

PHOTOFACT* Folder

*TRADE MARK

RETMA MEMBER

GENERAL ELECTRIC MODELS P725, P726

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

GENERAL ELECTRIC MODELS P725, P726

MODEL P725

GENERAL ELECTRIC MODELS P725, P726

TRADE NAME	General Electric Models P725, P726
MANUFACTURER	General Electric Co., Products Service, Radio Receiver Dept., 869 Broad St., Utica, N. Y.
TYPE SET	Battery Operated Portable AM Transistorized Receiver
POWER SUPPLY	6 Volts DC
RATING	7.5 MA @ 6 Volts DC
TUNING RANGE—BROADCAST	535KC - 1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.		Loop	455KC (400~ Mod)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
2.		"	1620KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	1500KC	Tune to 1500KC signal	"	A6	Adjust for maximum output while rocking tuning gang.
4.		"	580KC	Tune to 580KC signal	"	A7	"

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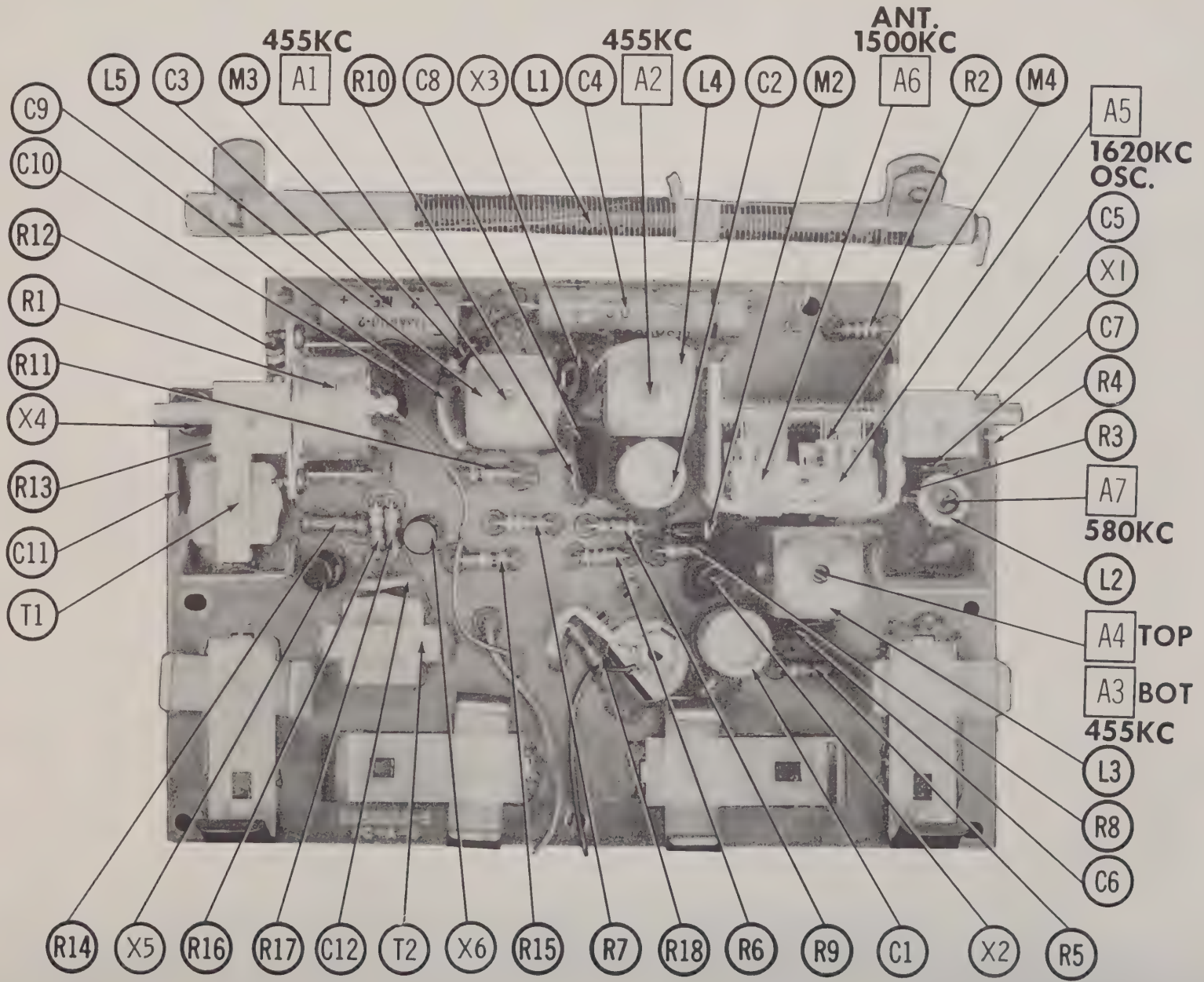


CHASSIS TOP VIEW

PARTS LIST AND DESCRIPTIONS

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA			NOTES
			CBS PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2N168A	Converter			2N212	Alternate Types: 2N165 or 2N169
X2	2N293	IF Amplifier				Alternate Types: 2N292 or 2N313
X3	2N165	IF Amplifier			2N94	Alternate Type: 2N169
X4	2N192	Driver				Alternate Type: 2N324
X5	2N320	Output				Alternate Type: 2N188A
X6	2N320	Output				Alternate Type: 2N188A

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	G. E. PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	8	3	RCE-257	XPP3V10	NL10-3	TT6X8	ML8-6	MMT-0210	TE-1053
C2	25	10	RS-1189	XPP10V25	NL25-10	TT10X25	ML30-15	MMT-0220	TE-1118
C3	2	10	RS-1087	XPP10V2	NL3-10	TT12X2	ML2-15	MT-0502	R2441 *
C4	100	10	RCE-259	PWE10V100	NL100-10		TD-100-15		R2418 *

* Non Catalog Item

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	G. E. PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C5	10000		RS-1022	BPD-01	DD-103	BYA6S1	ED-01	DC511	TG-S10	
C6	10000		RS-1022	BPD-01	DD-103	BYA6S1	ED-01	DC511	TG-S10	
C7	10000		RS-1022	BPD-01	DD-103	BYA6S1	ED-01	DC511	TG-S10	
C8	10000		RS-1022	BPD-01	DD-103	BYA6S1	ED-01	DC511	TG-S10	
C9	50000		RS-1024	BPD-05	DF-503				TG-S50	
C10	10000		RS-1022	BPD-01	DD-103	BYA6S1	ED-01	DC511	TG-S10	
C11	5000		RS-1023	BPD-005	DD-502	BYA6D5	ED-005	DC525	TG-D50	
C12	50000		RS-1024	BPD-05	DF-503				TG-S50	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	G. E. PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1	4000Ω	½	RS-1081					Volume & Switch

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	G. E. PART No.	IRC PART No.	
R2	39K			BTS-39K	
R3	1000Ω			BTS-1000	
R4	100K			BTS-100K	
R5	1000Ω			BTS-1000	
R6	47K			BTS-47K	
R7	4700Ω			BTS-4700	
R8	150Ω			BTS-150	Note 1
R9	2200Ω			BTS-2200	Note 2
R10	100K			BTS-100K	Note 3

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	G. E. PART No.	IRC PART No.	
R11	100Ω			BTS-100	Note 1
R12	390K			BTS-390K	
R13	27K			BTS-27K	
R14	220Ω		RRW-165		
R15	100Ω			BTS-100	Note 1
R16	15K			BTS-15K	
R17	15K			BTS-15K	
R18	22Ω			BTS-22K	

Note 1. When X2 is 2N313 or 2N292, value is changed to 100Ω.
Note 2. When X2 is 2N313 or 2N292, value is changed to 2700Ω.
Note 3. Some versions may use 120K in this application.

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (DRIVER)

ITEM No.	Turns Ratio		REPLACEMENT DATA						NOTES
	PRI.	SEC.	G. E. PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	3.5:	1	RLA-048						

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	G. E. PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	196Ω CT	3-4Ω	RS-1103				TR-21 ①		① Use original mounting frame.

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	G. E. PART No.	QUAM PART No.	
SP1	4"	PM	3-4Ω	ROP-036	4A07	

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA				NOTES
		G. E. PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Stick	RS-1086				
L2	Osc. Coil	RS-1085				
L3	1st IF	RS-1082		BC-327		
L4	2nd IF	RS-1083		BC-328		
L5	3rd IF	RS-1084		BC-329		

BATTERIES

ITEM No.	VOLTAGE	G. E. PART No.	REPLACEMENT DATA								NOTES
			BURGESS		EVEREADY		MALLORY		RAY-O-VAC		
			"A"	"B"	"A"	"B"	"A"	"B"	"A"	"B"	
M1	6V		2R		950		M13		2LP		Four 1.5V cells connected in series

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		G. E. PART No.	CBS PART No.	SYLVANIA PART No.	
M2	1N87G		1N60	1N60	AGC Diode (Pigtail)
M3	1N87G		1N60	1N60	Audio Det. (Pigtail)

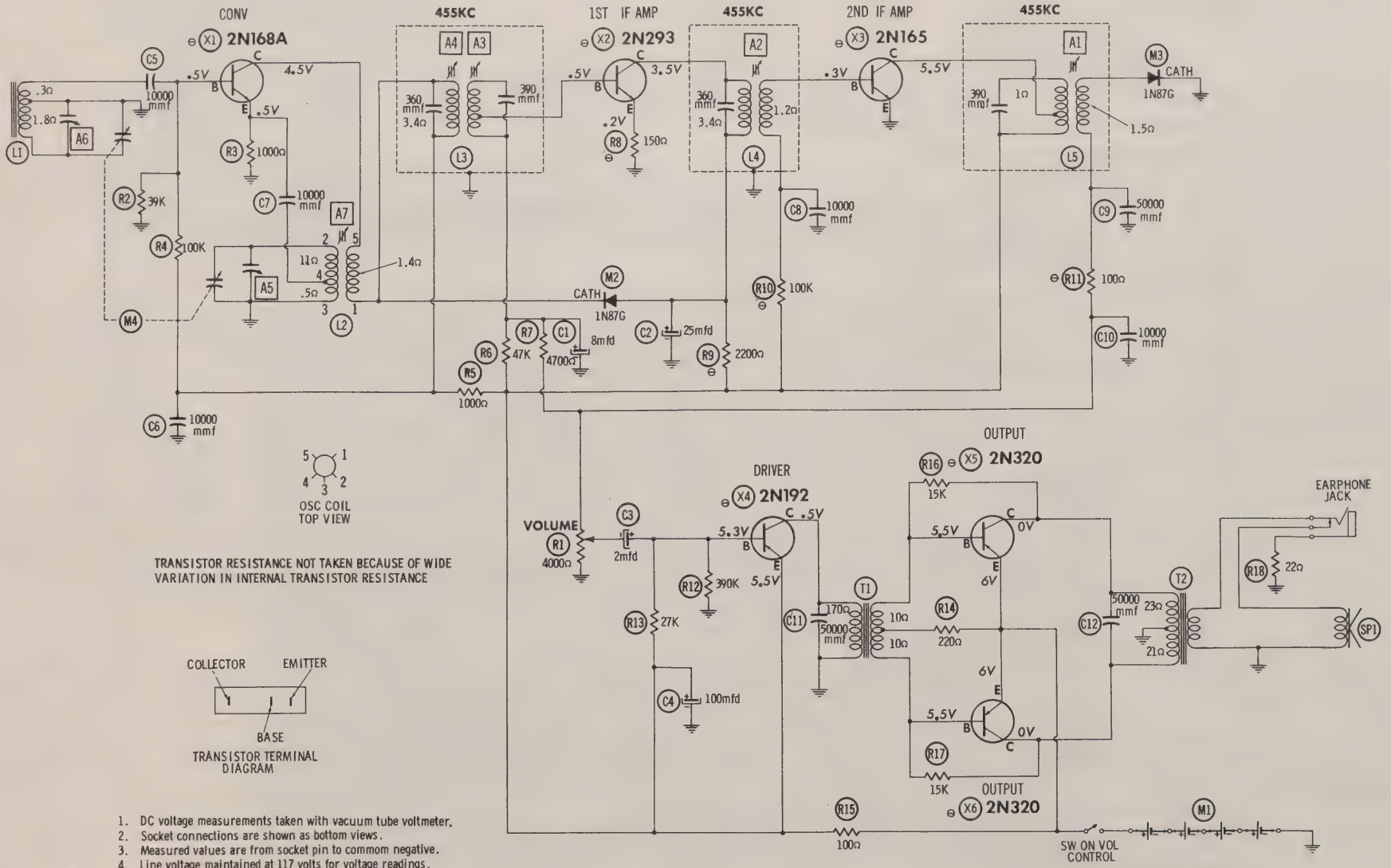
MISCELLANEOUS

ITEM No.	PART NAME	G. E. PART No.	NOTES
M4	Tuning Cap.	RS-1080	2 Gang (Ant. 12-210MMF)

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	RS-1070	On-Off-Volume, Brown, Model P725
Knob	RS-1071	On-Off-Volume, White, Model P726
Knob	RS-1068	Tuning, Brown, Model P725
Knob	RS-1069	Tuning, White, Model P726
Cabinet	RB-1032	Complete (except handle) Tan, Model P725
Cabinet	RB-1033	Complete (except handle) Turquoise, Model P726
Handle	RS-1063	Brown, Model P725
Handle	RS-1064	White, Model P726



1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to commom negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
Howard W. Sams & Co., Inc. 1957

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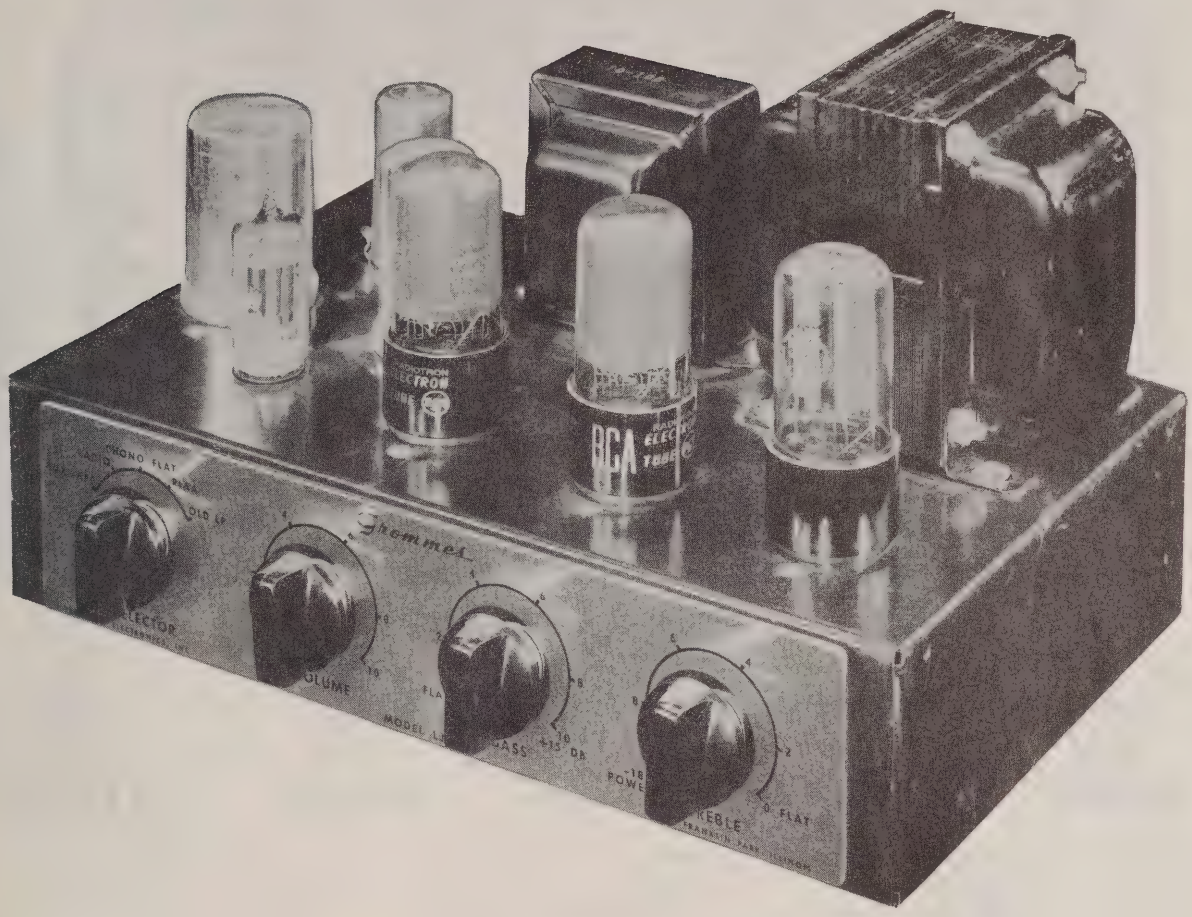
*TRADE MARK

GROMMES MODEL LJ-5

GROMMES MODEL LJ-5



GROMMES MODEL LJ-5

TRADE NAME	Grommes Model LJ-5
MANUFACTURER	Precision Electronics, Inc., 9101 King Ave., Franklin Park, Illinois
TYPE SET	AC Operated 4 Channel 10 Watt Audio Amplifier
TUBES (Five)	Types 12AX7 Preamplifier, 12AX7 AF Amp. - Phase Inv., (2) 6V6GT Output, 5Y3GT Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING .58 Amp. @ 117 Volts AC (58 Watts)

FROM THE
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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FOLDER 8

PARTS LIST AND DESCRIPTIONS

GROMMES
MODEL LJ-5

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Phono Preamplifier	12AX7	
V2	AF Amp. - Phase Inv.	12AX7	
V3	Output	6V6GT	

ITEM No.	USE	TYPE	NOTES
V4	Output	6V6GT	
V5	Rectifier	5Y3GT	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA GROMMES PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	▲40	400		AFH4-117-48	D0640	FP429	TMQ-92	Q-380	TVL-4734
B	▲30	350							
C	▲10	300							
D	20	25							
C2A	■10	250		AFH3-189-40	B0646	WP055	TMS-49	S-250	TVL-2556
B	▲100	15				TC52	TD-100-15	MTH-1510	

FIXED CAPACITORS

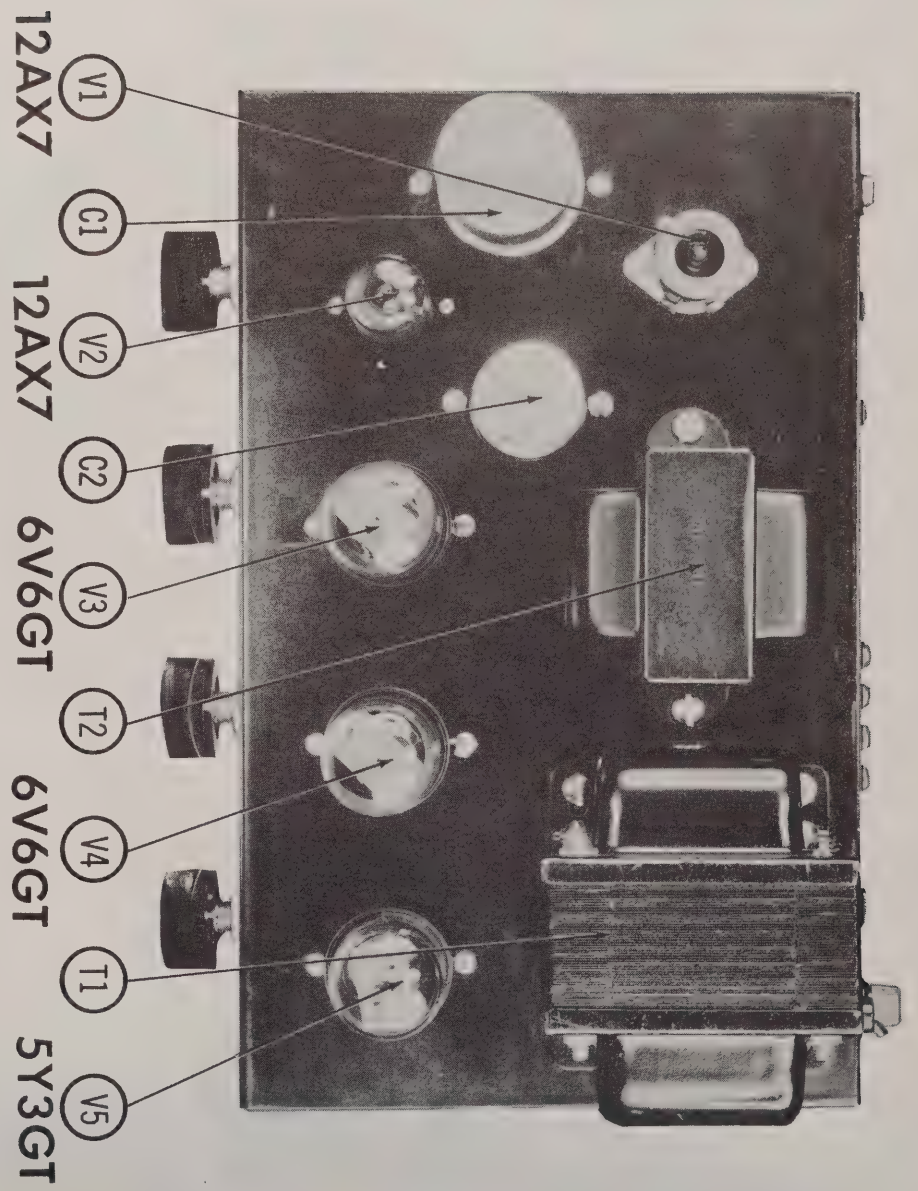
Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA GROMMES PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C3	800									10%
C4	1500						ED-1500			10%
C5	3000									10%
C6	100			1469-0001		22R5T1			MS-31	10%
C7	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C8	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C9	5000									10%
C10	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C11	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C12	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C13	470				D6-471	L10T47	ED-470			10%

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA GROMMES PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	2Meg	½	GVC2MT1M	BT-78	A47F3-2Meg	Q18-139X	UT-451	Volume, Tap @ 1Meg
B	Shaft			Not Req.	RS-2	Not Req.	Not Req.	
R2A	2Meg	½	LFBC2M	B-76	A47-2Meg-Z	Q13-139	U55	Bass
B	Shaft			Not Req.	RS-2	Not Req.	Not Req.	
R3A	500K	½	G500KWS	B-60	A47-500K-Z	Q13-133	U48	Treble
B	Shaft			Not Req.	RS-2	Not Req.	Not Req.	
C	Switch			KB-1	SWE-12	76-1	US-26	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	GROMMES PART No.	IRC PART No.	
R4	47K			BTS-47K	
R5	100K	1		BTA-100K	
R6	100K			BTS-100K	
R7	1000Ω			BTS-1000	
R8	3.3Meg			BTS-3.3Meg	
R9	100K			BTS-100K	
R10	47K			BTS-47K	
R11	100K			BTS-100K	
R12	470K			BTS-470K	
R13	100Ω			BTS-100	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	GROMMES PART No.	IRC PART No.	
R14	2200Ω			BTS-2200	
R15	100K			BTS-100K	
R16	470K			BTS-470K	
R17	470K			BTS-470K	
R18	470K			BTS-470K	
R19	300Ω	5		PW7-300	
R20	47K			BTS-47K	
R21	1000Ω			BTS-1000	
R22	5600Ω	2		BTB-5600	

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	GROMMES PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @ .58A	660VCT @ .072A	5VAC @ 2A	6.3VCT @ 1.4A	TP-2U	P9306 ①	P-3151 ①	PC8408 ①	24R02U①	R-11A ①

① Drill new mounting holes.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	GROMMES PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	7200Ω	16Ω Taps @ 8Ω, 4Ω	TO-10B	Z1112			26S59	S-28X	

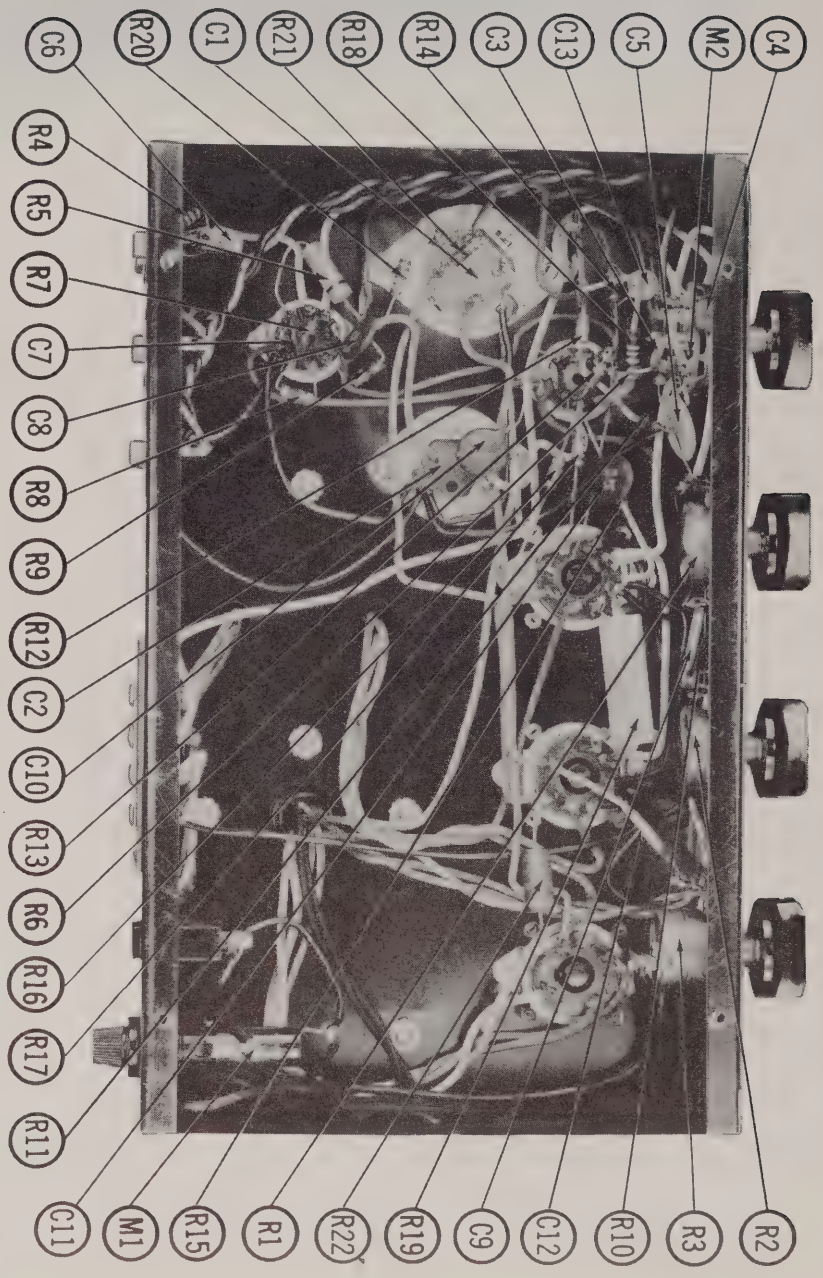
FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			GROMMES PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG	1½A 250V			3120L 5 (3AG 1½A 250V)	342001	AGC1½	HKP

MISCELLANEOUS

ITEM No.	PART NAME	GROMMES PART No.	NOTES
M2	Switch		Selector (Rotary Wafer Type)

CHASSIS—BOTTOM VIEW

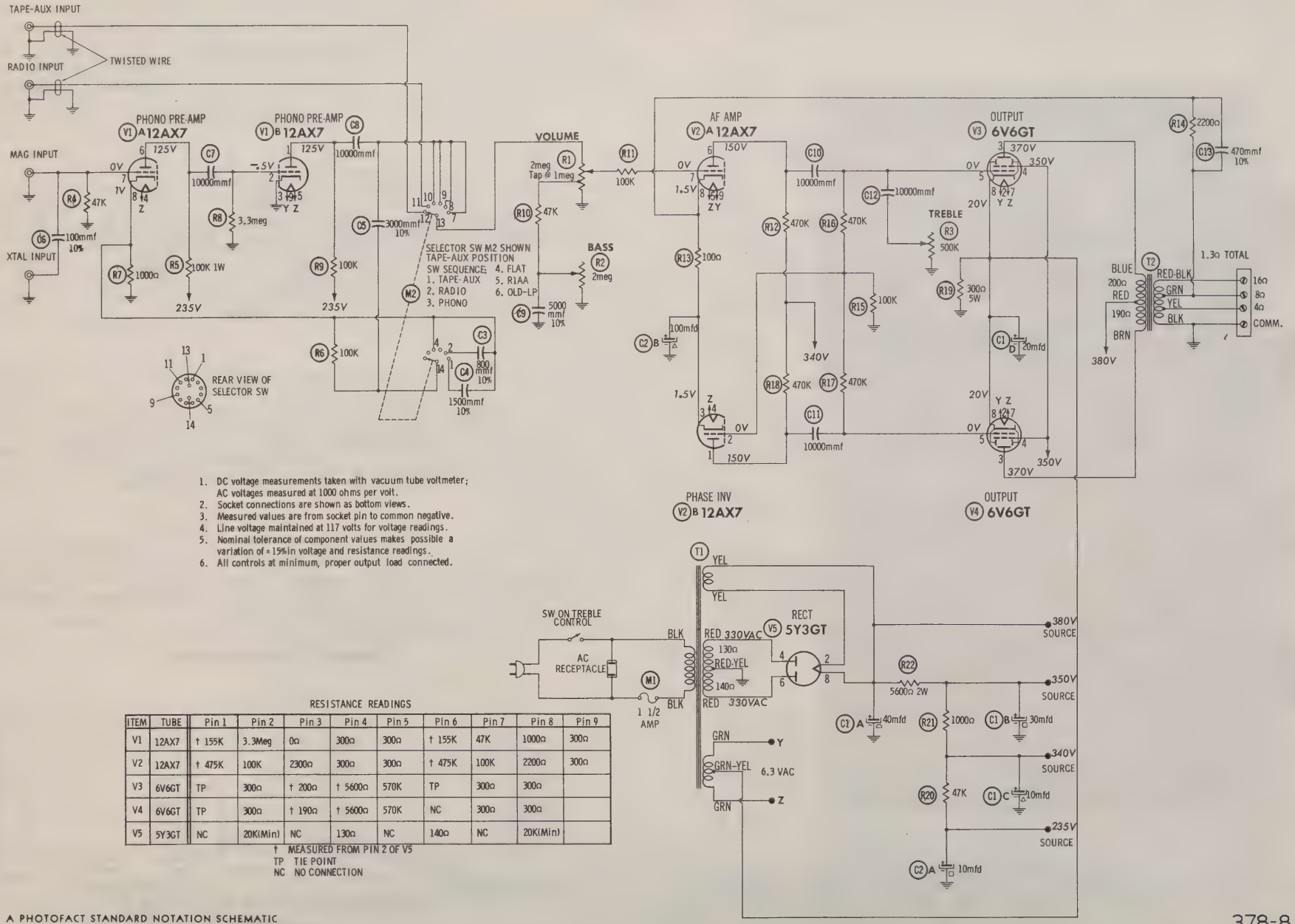


SET 378 FOLDER 8

FOLDER 8

GROMMES MODEL LJ-5

GROMMES MODEL LJ-5



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AX7	† 155K	3.3Meg	0Ω	300Ω	300Ω	† 155K	47K	1000Ω	300Ω
V2	12AX7	† 475K	100K	2300Ω	300Ω	300Ω	† 475K	100K	2200Ω	300Ω
V3	6V6GT	TP	300Ω	† 200Ω	† 5600Ω	570K	TP	300Ω	300Ω	
V4	6V6GT	TP	300Ω	† 190Ω	† 5600Ω	570K	NC	300Ω	300Ω	
V5	5Y3GT	NC	20K(Min)	NC	130Ω	NC	140Ω	NC	20K(Min)	

† MEASURED FROM PIN 2 OF V5
TP TIE POINT
NC NO CONNECTION

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*TRADE MARK

KNIGHT
MODELS 93SZ507, 93SZ740

PROPERTY OF
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DENVER, COLORADO

KNIGHT
MODELS 93SZ507, 93SZ740

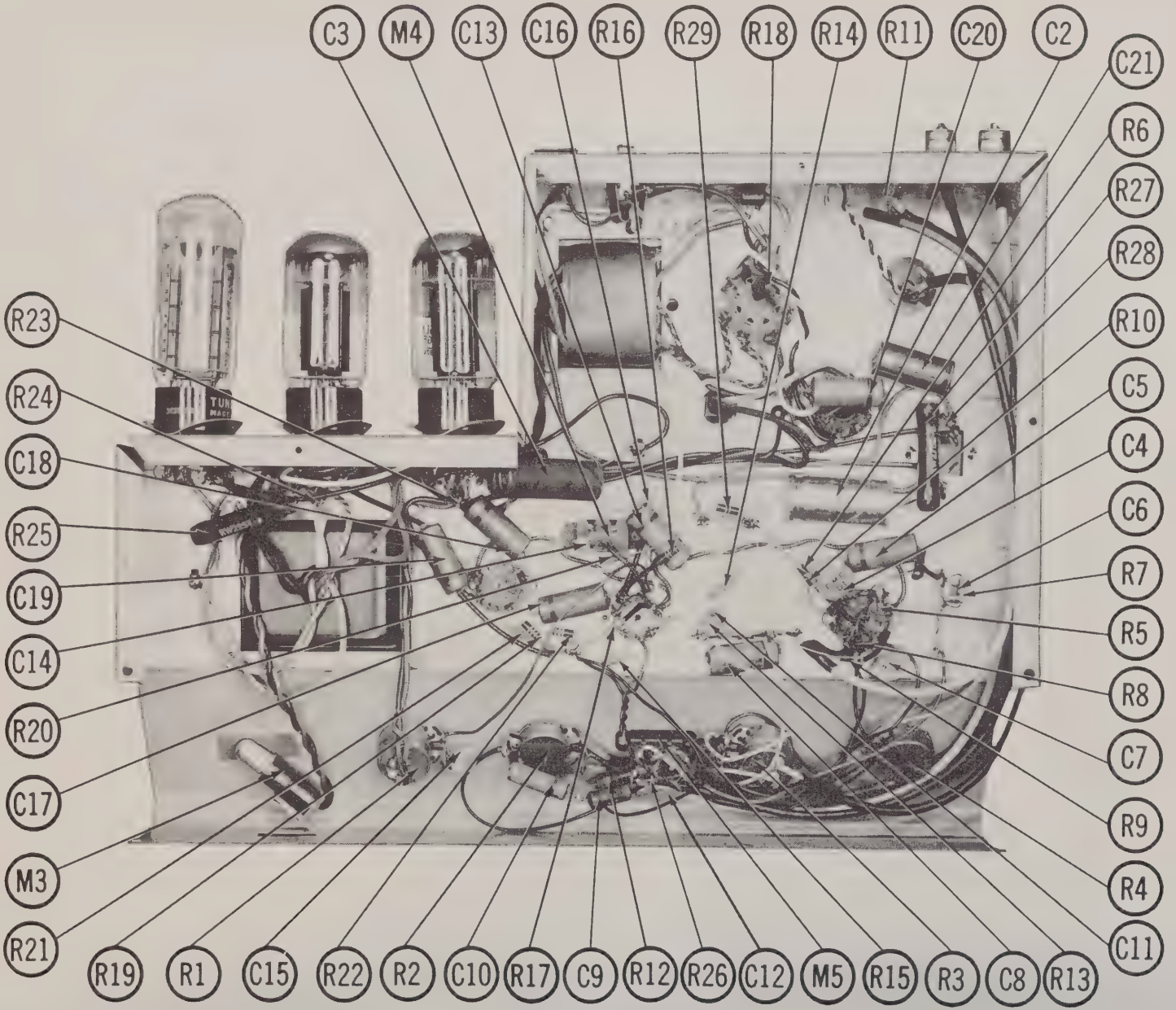
MODEL 93SZ740

KNIGHT
MODELS 93SZ507, 93SZ740

TRADE NAME	Knight Models 93SZ507, 93SZ740
SUPPLIER	Allied Radio Corp., 100 N. Western Ave., Chicago 80, Illinois
TYPE SET	AC Operated 5 Channel 32 Watt Audio Amplifier Model 93SZ740 Has 4 Speed Manual Record Player
TUBES (Six)	Types ECC83/12AX7 (or) 12AD7 Mic Preamplifier, ECC83/12AX7 (or) 12AD7 AF Amplifier, 6AV6 Phase Inverter, (2) 6L6GB Output, 5U4GB Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING .95 Amp. @ 117 Volts AC (95 Watts)

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1957 Howard W. Sams & Co., Inc., Indianapolis 5, Indiana. Printed in U.S. of America



CHASSIS BOTTOM VIEW

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Mic 1 Preamplifier-		
	Mic 2 Preamplifier	ECC83/12AX7	Note 1
V2	AF Amplifier	ECC83/12AX7	Note 1
V3	Phase Inverter	6AV6	

ITEM No.	USE	TYPE	NOTES
V4	Output	6L6GB	
V5	Output	6L6GB	
V6	Rectifier	5U4GB	

Note 1. Type 12AD7 may be used in some versions.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	KNIGHT PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	▲40	450		AFH3-41	C0320	FP396.2	TMT-36	Q-055	TVL-3783
B	■10	450							
C	▲10	450							
C2	8	450		PRS450V8	BR845	TC71	TD-8-450	MT-4508	TVA-1704
C3	35	50		PRS150V40	BR4015	TC48	TD-40-150	MT-1540	TVA-1308

FIXED CAPACITORS

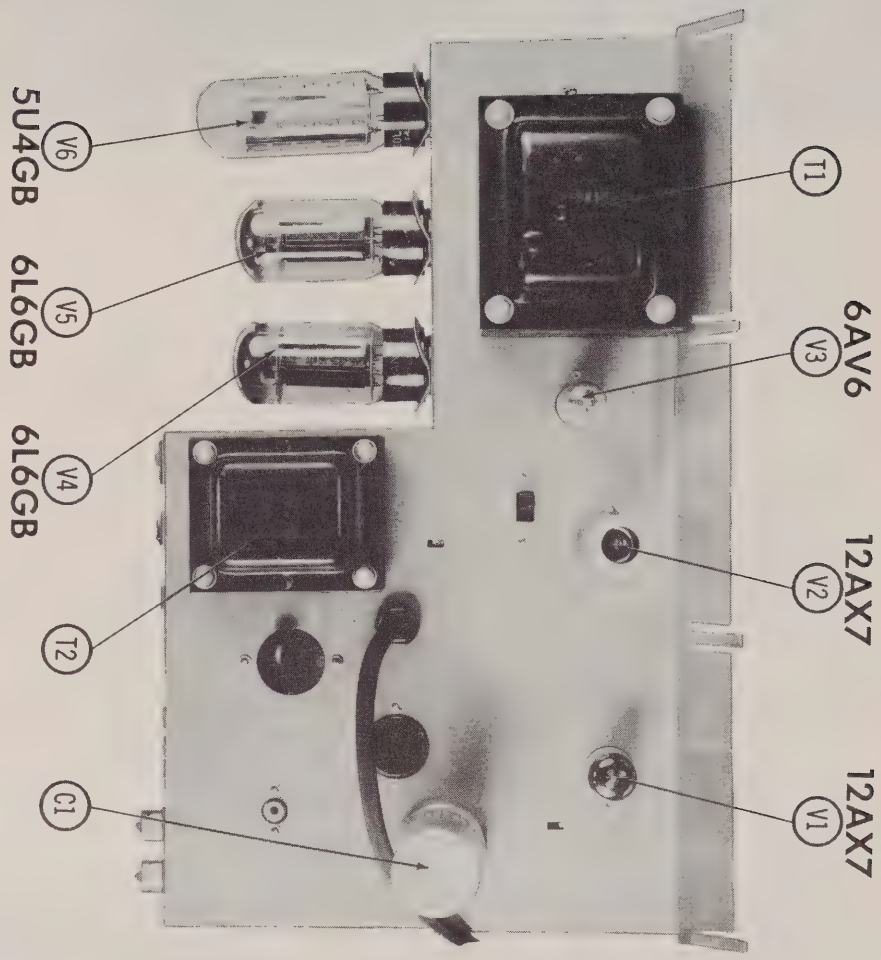
Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	KNIGHT PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C4	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C5	.047	600		P688N-047	DF-503	CUB6S47		GEM-6147	6TM-S47	
C6	220			BPD-00022	DD-221	L10T22	ED-220	UC-5322	5GA-T22	
C7	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C8	.047	600		P688N-047	DF-503	CUB6S47		GEM-6147	6TM-S47	
C9	.0033	600		P688N-0033	D6-332	CUB6D33	GP-3300	GEM-6233	6TM-D33	
C10	.01	600		P688N-01	D6-103	CUB6S1	GP-10000	GEM-611	6TM-S1	
C11	220			BPD-00022	DD-221	L10T22	ED-220	UC-5322	5GA-T22	
C12	100			NP0-SI 100	TCZ-100	C10T1C	TCO-100	ZT-531	5TCC-T1	NP0 10%
C13	.047	600		P688N-047	DF-503	CUB6S47		GEM-6147	6TM-S47	
C14	560			BPD-00056	DD-561	L10T56	ED-560	UC-5356	5GA-T56	
C15	1000						ED-1000			10%
C16	68			N750-SI 68	TCN-68	C10Q68U	TC7-68		5TCU-Q68	N750 10%
C17	.047	600		P688N-047	DF-503	CUB6S47		GEM-6147	6TM-S47	
C18	.047	600		P688N-047	DF-503	CUB6S47		GEM-6147	6TM-S47	
C19	.047	600		P688N-047	DF-503	CUB6S47		GEM-6147	6TM-S47	
C20	.047	600		P688N-047	DF-503	CUB6S47		GEM-6147	6TM-S47	
C21	.02	600		P688N-02	DD-203	CUB6S2	ED-02	GEM-612	6TM-S2	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESIST-ANCE	WATTS	KNIGHT PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	1Meg	½	RP-105AC-C	B-70	A47-1Meg-Z	Q13-137	U53	Tone
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
C	Switch			KB-1	SWE-12	76-1	US-26	
R2A	4Meg	½	RP-405A					Phono 1 & 2 Fader, Tap② 2Meg
B	Shaft							
R3A	1Meg	½	RP-105AC-C	B-70	A47-1Meg-Z	Q13-137	U53	Mic 2-Mag
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
C	Switch			KB-1	SWE-12	76-1	US-26	
R4A	1Meg	½	RP-105AD	B-70	A47-1Meg-Z	Q13-137	U53	Microphone 1
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	KNIGHT PART No.	IRC PART No.	
R5	10Meg			BTS-10Meg	
R6	220K			BTS-220K	
R7	220K			BTS-220K	
R8	10Meg			BTS-10Meg	
R9	100K			BTS-100K	
R10	220K			BTS-220K	
R11	47K			BTS-47K	
R12	22K			BTS-22K	
R13	220K			BTS-220K	
R14	220K			BTS-220K	
R15	3300Ω			BTS-3300	
R16	68K			BTS-68K	
R17	3300Ω			BTS-3300	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	KNIGHT PART No.	IRC PART No.	
R18	68K			BTS-68K	
R19	470K			BTS-470K	
R20	47K			BTS-47K	
R21	680Ω			BTS-680	
R22	47K			BTS-47K	
R23	330K			BTS-330K	
R24	330K			BTS-330K	
R25	250Ω	10	RW2251-A	PW10-250	
R26	470K			BTS-470K	
R27	7500Ω	10	RW2752-B	PW10-7500	
R28	10K			BTS-10K	
R29	22K			BTS-22K	

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	KNIGHT PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @ .95A	710VCT @ .125A	5VAC @ 3A	6.3VCT @ 2A	LP-0259	P9315	P-2953	PM8410	24R05	R-14B

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	KNIGHT PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	6000Ω CT	500Ω Tap @ 250Ω, 70V, 16Ω, 8Ω, 4Ω	L0-0151						

PARTS LIST AND DESCRIPTIONS (Continued)

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA						REMARKS
	KNIGHT PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.			
		CARTRIDGE	NEEDLE	CARTRIDGE	MOUNT		
M1		55T * P-55-T	GD	56 * 2756	PT-2	* Tone arm complete with cartridge	

ASTATIC NEEDLE LISTING SHOWN ABOVE IS SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGE LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENTS SEE BELOW.

PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

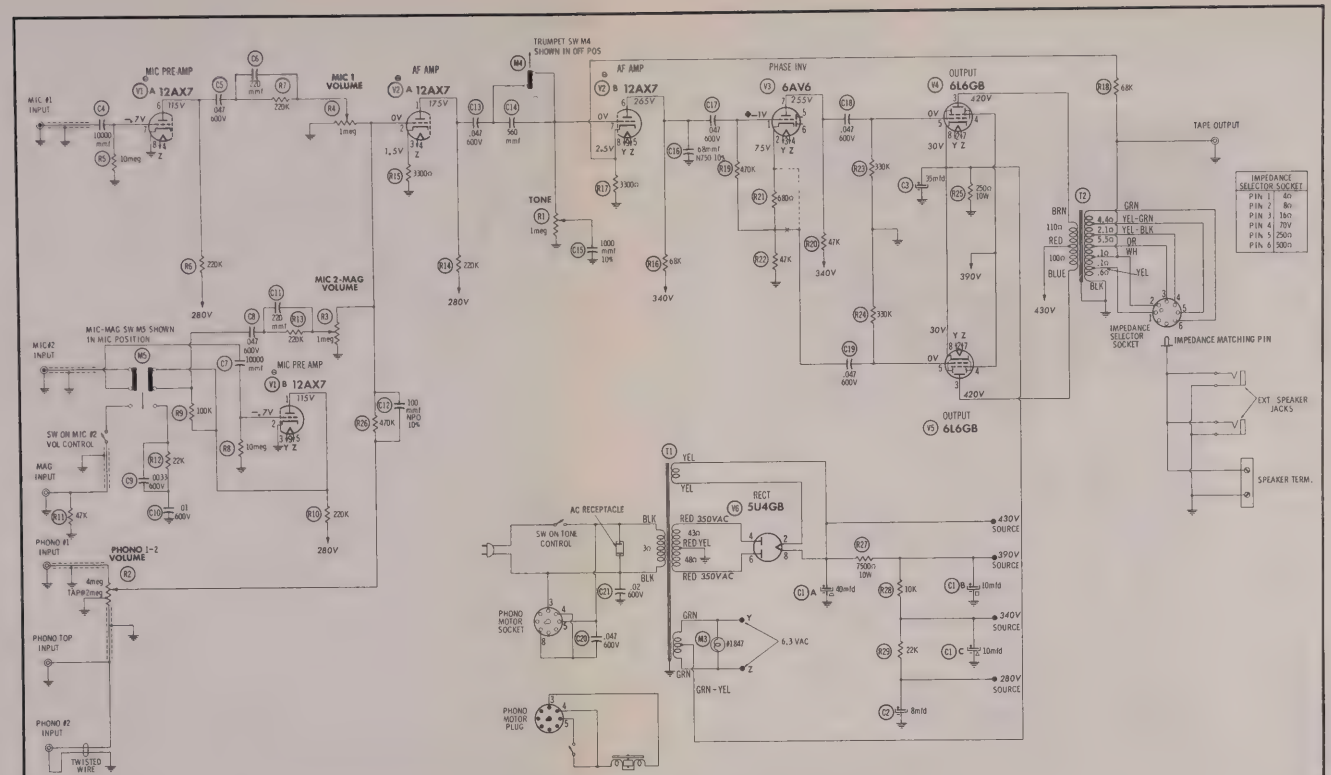
ITEM No.	REPLACEMENT DATA			REMARKS
	KNIGHT PART No.	JENSEN PART No.	WALCO PART No.	
M2		† A-71 or † ♦ A-71SD or ♦ A-71D	* W-8TPA or † W-8TPS or † ♦ W-8DS or ♦ W-8TPD	* Metal † Jewel ♦ Diamond

MISCELLANEOUS

ITEM No.	PART NAME	KNIGHT PART No.	NOTES
M3	Indicator Light		#1847
M4	Switch		Trumpet Protector (Slide Type, SPDT)
M5	Switch		Mic-Mag (Slide Type, DPDT)

TRUMPET PROTECTOR SWITCH (M4)

When trumpet speakers are connected to the amplifier, the switch (M4) should be moved to the "ON" position to provide protection to the speakers by attenuating the lowest frequencies. The switch should be in the "OFF" position when trumpet speakers are not used.



1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

❷ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AX7	↑ 260K	10Meg	0Ω	250Ω	250Ω	↑ 260K	10Meg	0Ω	250Ω
V2	12AX7	↑ 260K	240K	3300Ω	250Ω	250Ω	↑ 85K	1Meg	3300Ω	250Ω
V3	6AV6	515K	47K	250Ω	250Ω	NC	NC	↑ 65K		
V4	6L6GB	0Ω	250Ω	↑ 110Ω	↑ 7500Ω	330K	NC	250Ω	250Ω	
V5	6L6GB	0Ω	250Ω	↑ 100Ω	↑ 7500Ω	330K	NC	250Ω	250Ω	
V6	5U4GB	NC	20K(Min)	TP	48Ω	TP	48Ω	NC	20K(Min)	

↑ MEASURED FROM PIN 8 OF V6
+ MEASURED FROM PIN 2 OF V3
NC NO CONNECTION
TP TIE POINT

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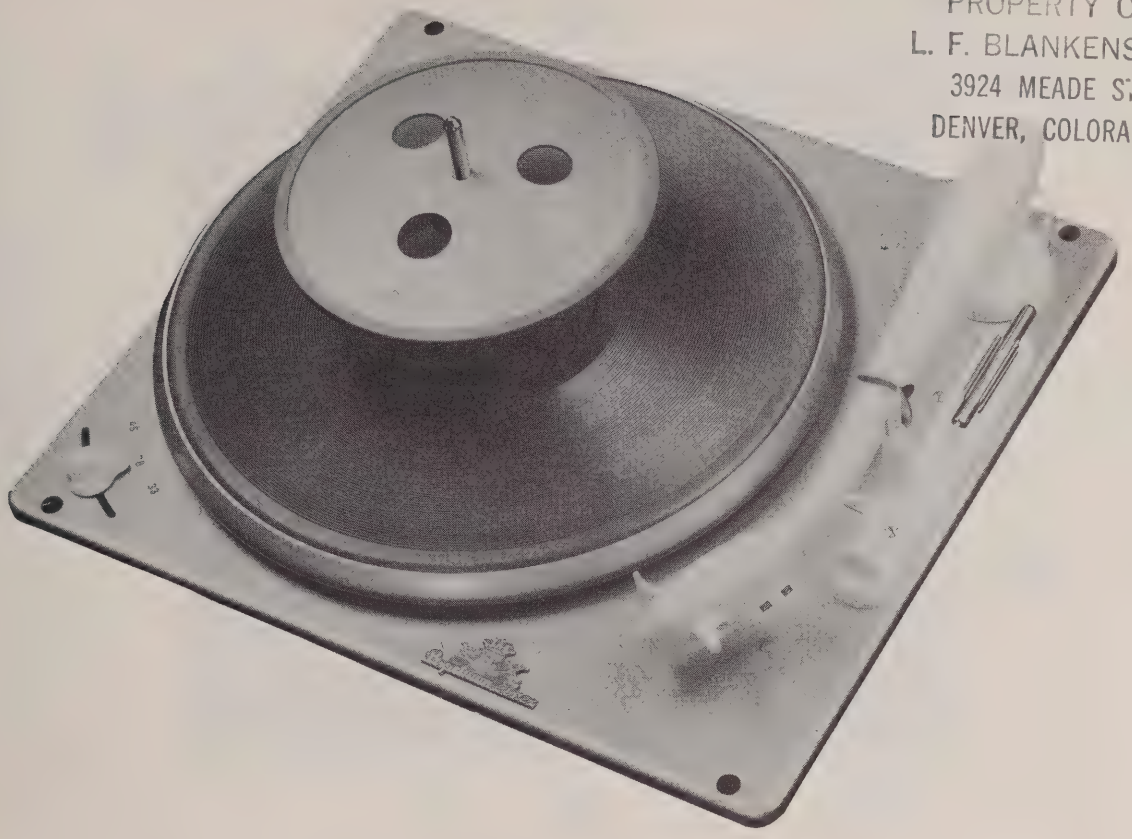
PERPETUUM-EBNER
MODELS "REX A", "REX AA"



PERPETUUM-EBNER
MODELS "REX A", "REX AA"

GENERAL INFORMATION

The Perpetuum – Ebner Model "Rex A" is a three speed changer and the "Rex AA" is a four speed changer with a plug-in tone arm.

These changers will play any assortment of records between 7 and 12 inches.

Turntable Speed "Rex A"	33 1/3-45-78 R.P.M.
Turntable Speed "Rex AA"	16-33 1/3-45-78 R.P.M.
Record Capacity	Ten Records Any Assortment.

A friction unit incorporated in the pickup arm ensures that no misalignment will take place should the arm itself be forcibly held during a change cycle.

These models are designed to operate on 110 volt, 60 cycle A.C. only.

MANUFACTURED BY:

PERPETUUM - EBNER
ST. GEORGEN SCHWARZWALD
WESTERN GERMANY

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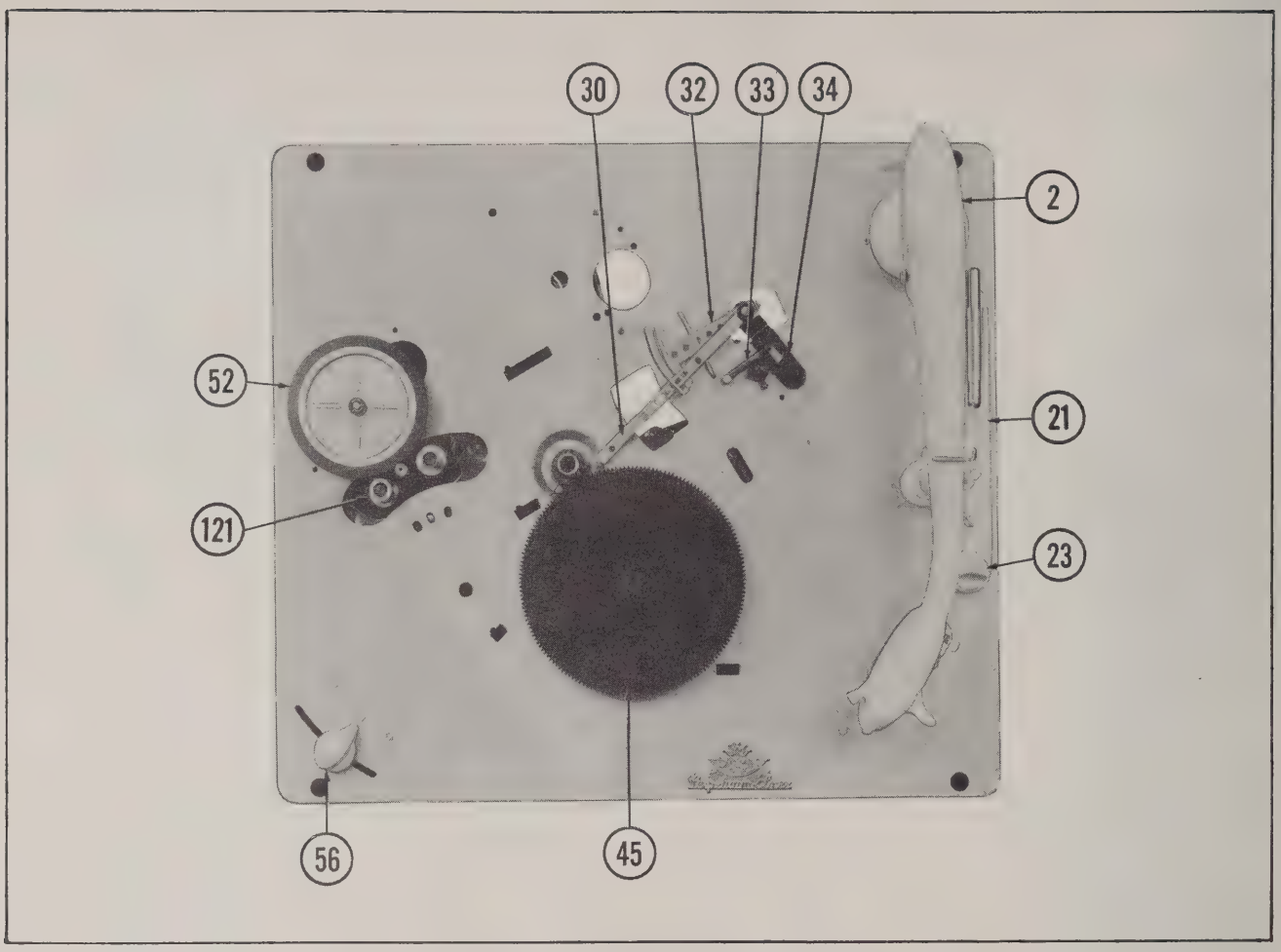

FIGURE 1

OPERATING INSTRUCTIONS

Loading Of Records For Automatic Playing –

Note that the record balancing (holding) disc and the spindle itself are removable, thus permitting the changer to be used at will as changer or player. The changer spindle will slide into proper position when its longitudinal slot is pointed toward the front of the chassis.

Insert either the standard 7mm spindle or the large 45 rpm 1 1/2 o.d. spindle. Then load up to 10 records – any size in any sequence – from 6" to 12" but all of the same speed onto the spindle. If 7mm spindle is used, place record-balancing disc on spindle on top of records. It slides into position when red dot is toward the front. No balancing disc is required for 45 rpm spindle.

Starting –

Stand in front of changer, facing it. Toward your right hand is the pick-up arm, held by a clamp.

(a) Release this clamp by swinging it free on its pivot toward your right.

(b) To start changer, slide the little indented plastic start button toward the rear as far as it will go. (This button is situated on the front of the pick-up arm rest). Hold the button until the turntable has completed at least two revolutions. Now release the button. The arm will lift, lowest record will drop into the indexing position (about 1/3 of the way to the turntable) and pause there until the pick-up arm measures its correct size, and only then will the record drop into playing position. With this patented intermix mechanism, the REX can automatically play all size records including "odd" sizes.

Tripping –

At the end of each record, a conventional changer needs fast finishing grooves to trip the change mechanism – but not the Rex – whether a record has or has not these fast finishing grooves, the velocity trip plus positive distance actuated tripping mechanism of the Rex changer will unerringly trip the changer mechanism at the end of each record.

Rejecting –

To reject any record while playing, merely push, then promptly release the start button. The muting switch and change mechanism will immediately react and will drop and play the next record in the stack. If you reject the last record, the unit will shut-off automatically.

Stopping Or Forcibly Withholding –

This unit may be stopped at any time by lifting

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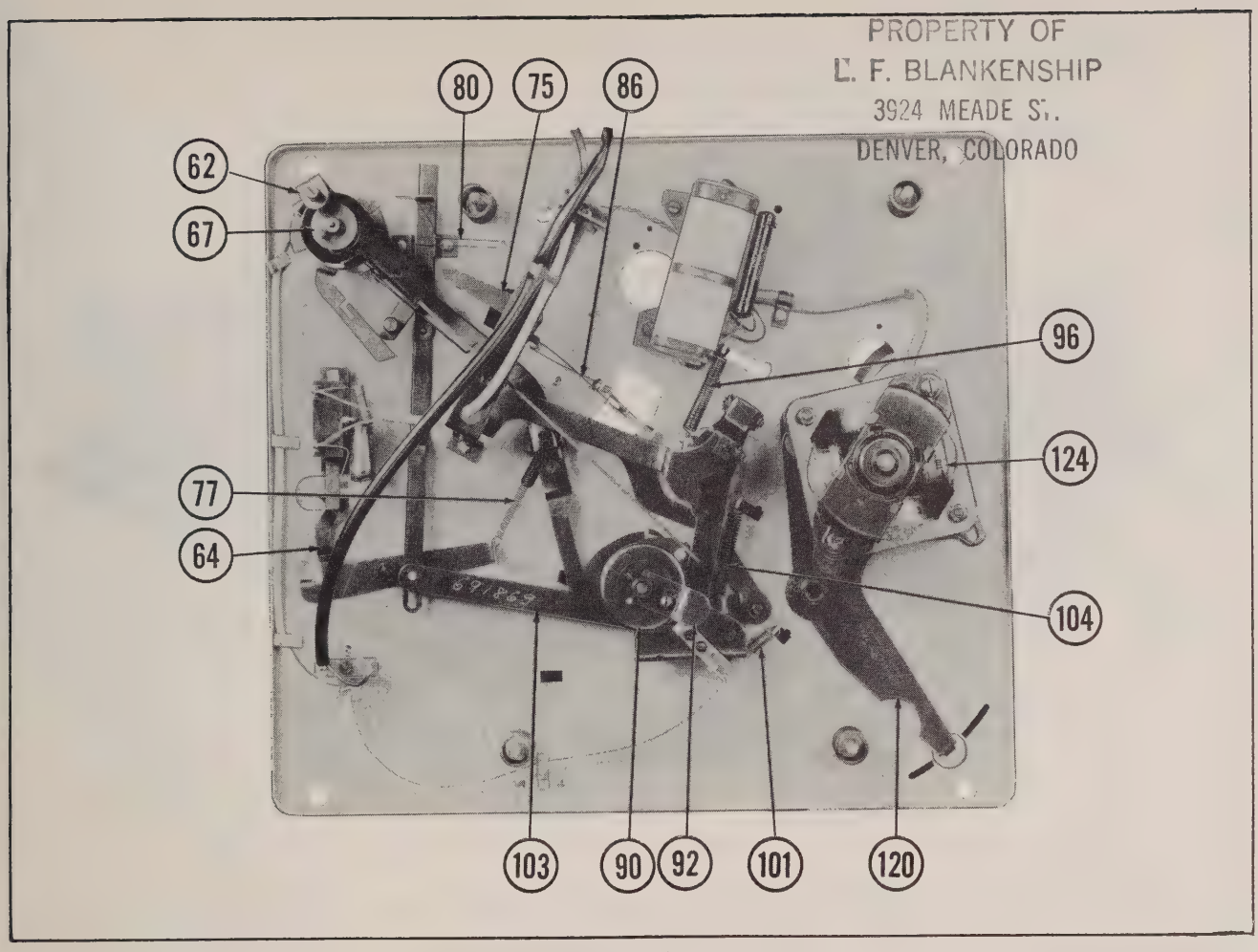

FIGURE 2

the arm from the record and placing it on the arm-rest. Do not be afraid to withhold the arm by force. This unit is Jam-Proof and Fool-Proof. To play the record that was being played before stopping, lift arm from its rest and place it on the record. To play the next record in the stack, simply push the start button (hold it for two revolutions).

Automatic Muting Switch —

You will notice how quiet the changer remains during change cycles. Attribute this to the automatic muting switch.

Automatic Shut-Off —

At the end of the last record, the arm will return to its rest position on the arm-rest and shut-off the motor automatically.

Unloading —

To remove the stack of records from turntable, lift spindle out of its hole.

Speed Setting —

The speed control is located on the left front corner of the chassis, with 3 or 4 fixed positions (78-45-33 1/3-16 rpm). Speed can be changed even while turntable is in motion.

Manual Playing —

Replace changer spindle with shorter manual spindle round end up. (Short spindle does not have to be positioned into any slot). Now your changer is transformed into a manually operated turntable. Put on the record. (For 45 rpm, use 45 rpm insert.) Lift the arm from its rest; place it on the record. At the end of the record, the arm will return automatically to its rest and the unit will shut off. The reject-button also works on the manual player — i.e. shuts off automatically, the same way as with the last record on the changer.

RECORD CHANGING

Record Ejector —

On both the thin 1/4" and the thicker spindle, the records are ejected by a sideways movement of the pusher.

Automatic Shut-Off —

The switch lever (114) is raised to its rest position when no further records are resting on the offset of the spindle. This means that the pickup arm will not swing again over the turntable.

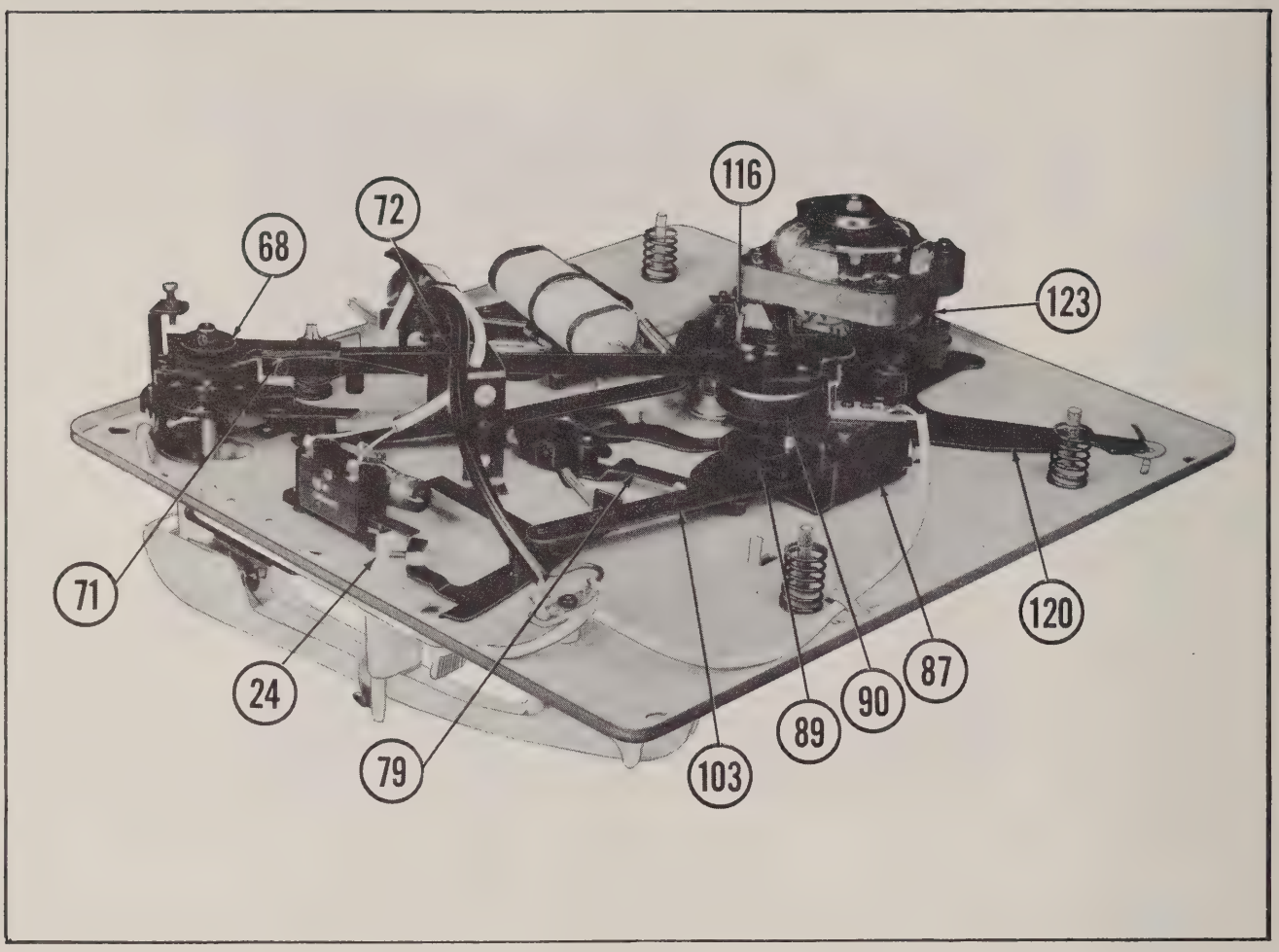

FIGURE 3

Operation Of The 1/4" Spindle –

The records rest on the offset shelf of the spindle and are held in position by the record support disc (37). The bottom record of the stack is ejected in three distinct stages.

(a) The lowest record of the stack is pushed forwards over the edge of the shelf by the tab on the end of the ejector link. This causes the record to drop onto the holding tab.

(b) The holding tab projecting out of the spindle holds the record in the scanning position and, at the same time, the weight of the record will force the ejector link downwards to actuate the switch lever (114). This will bring the set-down lever (81) to its operating position so that the pickup arm is caused to move in over the turntable. In the scanning position the actual pickup scans the edge of the record and so locates its size.

(c) The ejector slide moves back again to its at rest position causing the holding tab to be withdrawn again into the spindle and allowing the record to drop down onto the turntable. Simultaneously the ejector link is raised again to its original position.

Operation Of The 1 1/2" Spindle –

This spindle requires no record support disc. In principle it works just the same as the thinner spindle with the exception that ejection is slightly different i.e. the two lowest records in the stack are moved at the one time.

MOVEMENT OF THE PICKUP ARM

Raising And Lowering Pickup Arm –

The pickup arm is lifted clear of its rest by the lift pin (19) and rocker arm (66) both of which are actuated by the bell-shaped cam (90). The lightly-balanced and freely-swinging rocker arm is held by its own weight on the bell-shaped cam.

When the bell-shaped cam is at rest, the lower end of the rocker arm should be resting on the lowest point of the cam edge. As the bell-shaped cam rotates, it will lift one end of the rocker arm which in turn will then press on the cone (67) of the locator and cause the pickup arm to be lifted. The amount of lift is adjusted by means of a set screw on the stand (62) of the pickup arm so that as the arm swings outwards it clears bottom of the last record on the stack by between 1/8 and 3/16".

Outwards Movement Of Pickup Arm To The Stop On The Arm Rest –

The outwards movement of the pickup from the center of the record is caused by the movement of the outwards movement lever (103 and the outwards movement link. These also cause the friction-loaded locator (62A) to move as well. At its full-out position, the pickup arm will come to rest against the stop on the arm rest whereas the carrier will continue to

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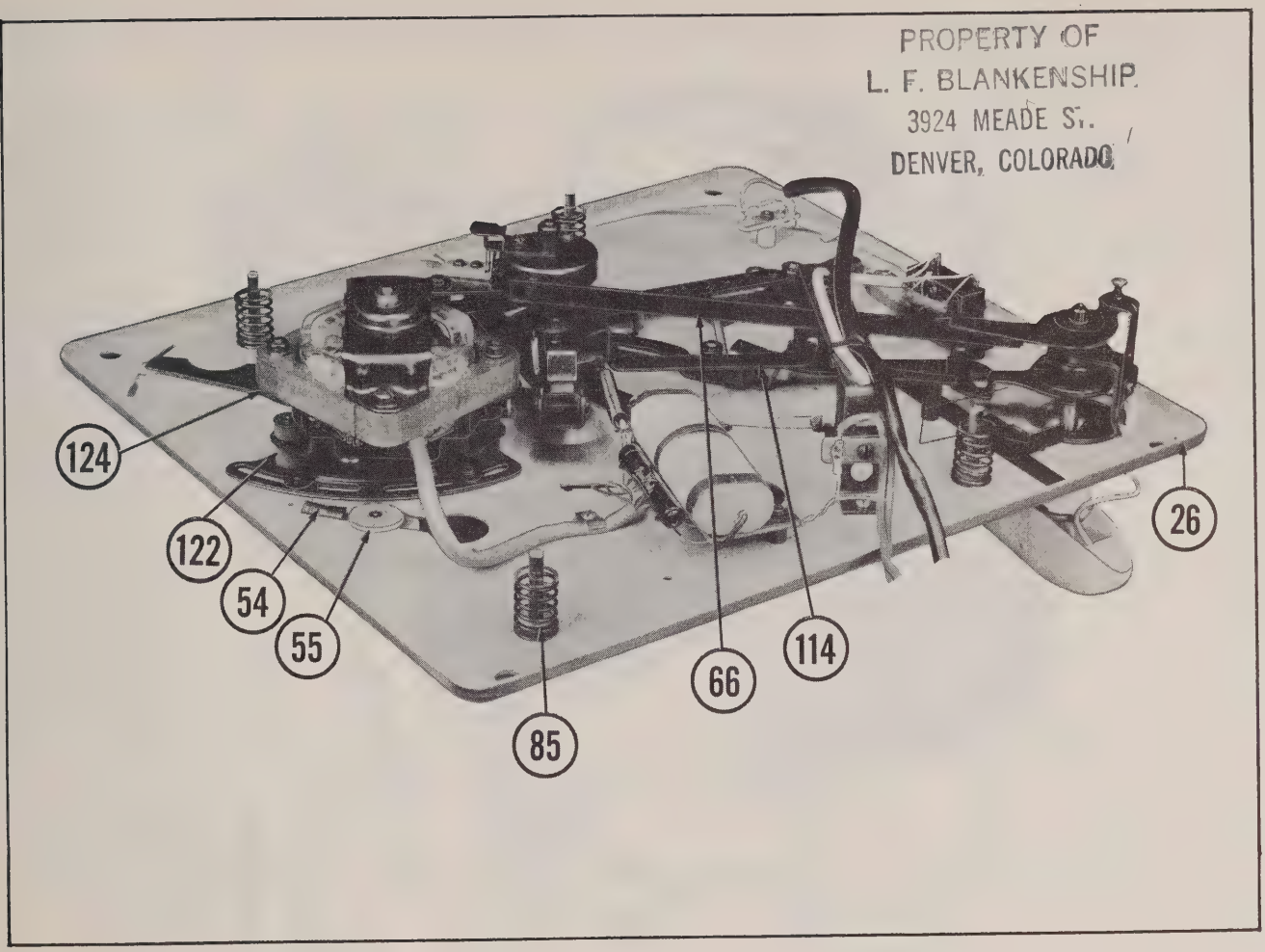


FIGURE 4

rotate until its tab is brought to a standstill by the rest.

Inward Movement Of Pickup To Edge Of Record –

The inclined record is located for size by the pickup arm in that pressure is applied to the locator on the pickup arm by the return locator cam over the return locator lever and the set-down lever (81). The locator will continue to rotate and the pickup arm to move inwards until the locator tab (2A) on the pick-up arm brushes against the outside edge of the record.

Any further movement made by the return locator cam and therefore of the return locator lever (62A) and set-down lever (81) is absorbed by the friction device on the locator itself. This friction unit will be loaded to a greater or lesser degree according to the size of record on the turntable - on large records to a greater extent and smaller records to a lesser degree.

In the operating position, described in Automatic Shut-Off under Record Changing, the set-down lever (81) should butt against the stop on the plate of the locator (62A). When no weight is forcing the ejector link (107A) downwards (no record on the holding tab) the set-down lever (81) will be raised to the switch-off position and will be positioned above and clear of the locator (62A).

Inward Movement Of Pickup To Position Over Lead-In Groove Of Record –

The second stage of the inward movement of the pickup arm is made after the record has dropped onto the turntable. The pickup arm must now be caused to swing inwards until the needle is positioned above the led-in grooves of the record. This movement is actuated by the return locator cam (89A).

OPERATION OF THE CAMS

The main control shaft (45A) is swivel-mounted in the housing (87) and holds the main driving gear (45) the return locator cam (89A) main cam assembly, (89) ejector cam (89B) and bell-shaped cam (90).

Operation Of The Main Cam Assembly (89) –

The whole operation of the change-over mechanism is controlled and actuated from the gearwheel (45) which, as the starter button (23) is pressed or as the trip link (30) is tripped, is forced by the spring and the main cam assembly (89) to move in towards the gear pinion (44A) on the turntable. The gearwheel (45) makes one complete revolution to effect a complete change cycle.

After the change cycle is completed, a spring (101) withdraws the housing to its at rest position so that the gearwheel (45) and gear pinion (44A) are forced out of mesh.

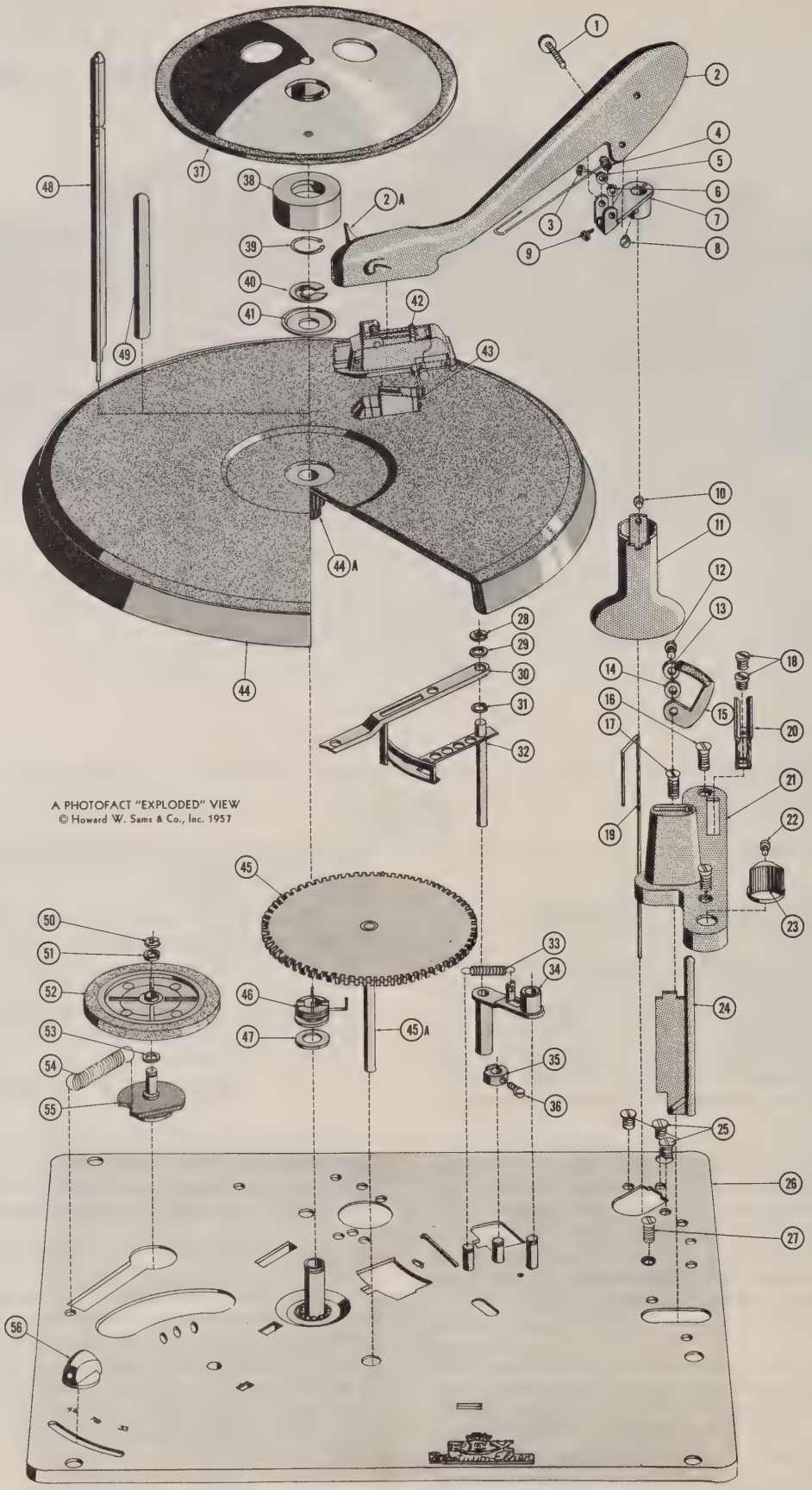


FIGURE 5A. EXPLODED VIEW OF PARTS ABOVE BASEPLATE.

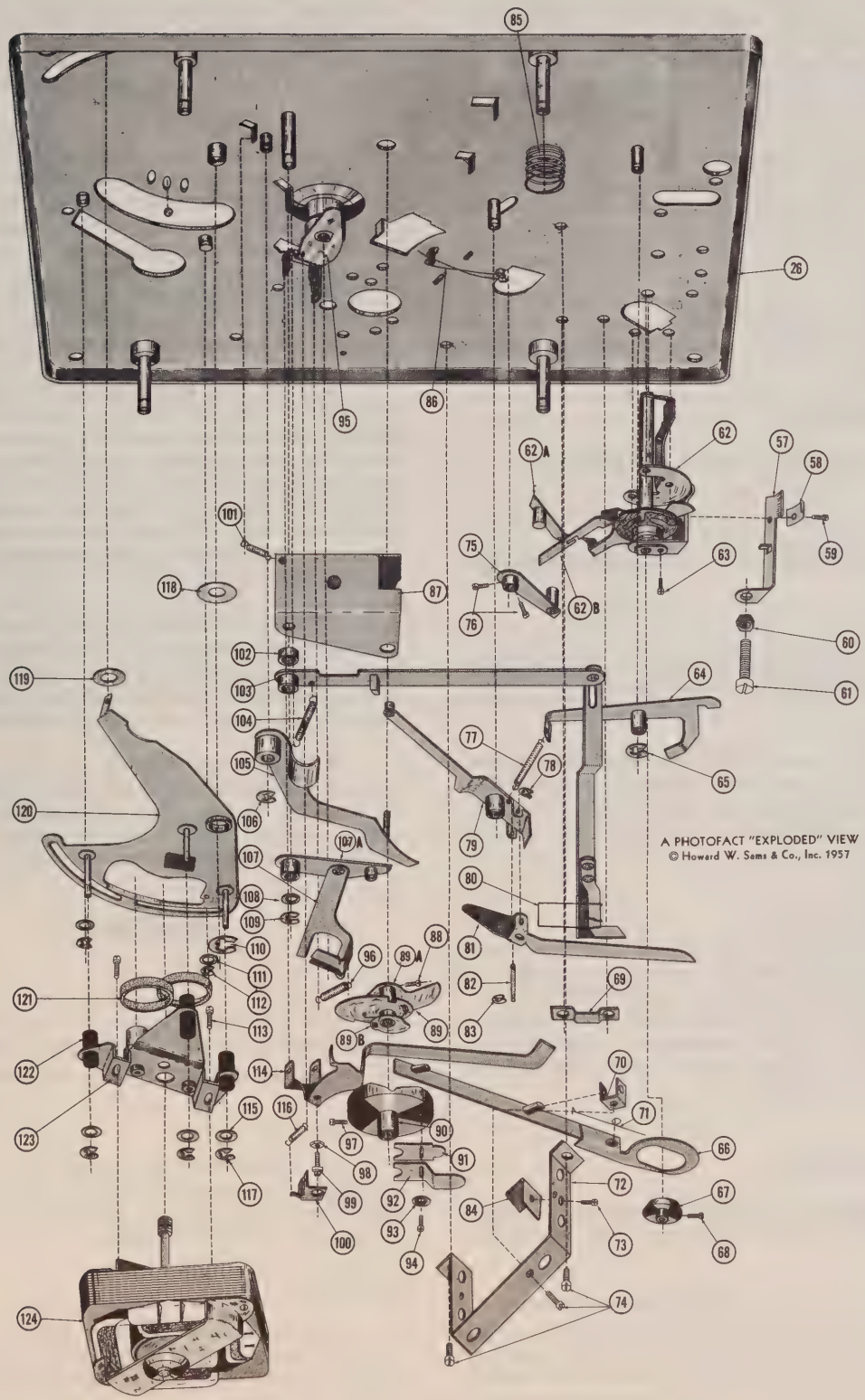


FIGURE 5B. EXPLODED VIEW OF PARTS BELOW BASEPLATE.

As the outwards movement lever (103) is tripped, the locking segment on the main cam assembly (89) springs over to the front of the slot that the tag on the lever presses against the locking segment and causes the complete housing to move inwards. After one complete cam revolution, the blocking segment releases the slot and the pressure of the lever is released from the main cam assembly. The spring draws the housing to the rear and the two gearwheels are disengaged. The main cam assembly also controls the outwards movement of the pickup arm.

Return Locator Cam (89A) –

This cam controls the return movement and location of the pickup arm.

Ejector Cam –

The ejector cam actuates the moving sideways of the record, its holding in position and its dropping on the turntable.

Bell-Shaped Cam (90) –

This controls the raising and lowering of the pickup arm.

AUTOMATIC CHANGE CYCLE AFTER EACH RECORD

Tripping –

Tripping takes place as soon as the distance between center of the record and the needle is less than 2 1/2".

The friction lever (62B) resting on the locator plate steadily feeds the easily swinging trip link (30) up to the loop on the turntable pinion (44A). An adjustment disc is provided to increase the friction exerted by the friction unit.

Automatic Change Cycle –

As the needle leaves the recorded section of the record, the trip link (30) will move quickly inwards so that the loop on the turntable pinion (44A) strikes it on the side and force it against the tag on the main switch lever (105). This movement is then transmitted to the outwards movement lever (103) and the change cycle set in motion.

Automatic Switching Off –

The change cycle mechanism will be automatically set in motion again after the tenth record has been played.

Due to there being no further record resting on the spindle (48) the switch lever (105) will rise to its at rest position but the set-down lever (81) remains where it is i.e. in the switched-off position so that it does not butt up against the stop on the locator and the pickup arm will not be caused to swing inwards again over the turntable.

The belt-shaped cam (90) causes the pickup arm to drop down onto the arm rest so that the motor is switched off.

STARTING AND CHANGE CYCLE STAGES

Press starter button (23), lift pickup arm rest, motor switch is switched on, motor will run and turntable will revolve. Starter button moves outwards movement lever (103), blocking segment moves to other side of slot, main cam assembly (89) presses housing toward center, gearwheel (45) engages with gear pinion (44A), gearwheel rotates in anti-clockwise direction.

Bell-shaped cam (90) lifts pickup arm, ejector cam (89A) moves to ejector position, record drops about a third of spindle length, weight of record forces tag on ejector link downwards, set-down lever (81) moves to operating position.

Return locator cam (79) causes pickup to move inwards. Tag on pickup brushes outer edge of record, friction unit locates and sets size of record.

Ejector cam (89A) causes record to drop onto turntable during size location, pickup arm moves into position over lead-in grooves on record. Bell-shaped cam (90) causes pickup arm to set-down on record. Horizontal and vertical control units are now inactive, pickup arm can move freely, stop on outwards movement lever engages in main cam assembly (89), change cycle mechanism now totally disengaged. Pickup arm trails friction lever (62B) as it moves.

After the record is played, tripping takes place when needle is roughly 2 1/2" from center of record. Needle enters grooves after recorded section, change cycle mechanism again engaged and whole process is repeated again until last record has been played.

With no more records on offset shelf, ejector link not depressed, set-down lever moves to switched off position, pickup arm does not swing in again but drops onto arm rest where the switch cuts off the motor and the turntable ceases to revolve.

MAINTENANCE

Motor –

The motor is provided with sintered metal bearings which are sufficiently lubricated before leaving the factory and will require no further attention.

Pulleys –

All pulleys can be lubricated occasionally by dropping a few drops of oil on the bearing points. When replacing pulleys, ensure that the fiber disc are in place at top and bottom.

Idler Wheel –

The spindle of the idler wheel can be periodically lubricated with a few drops of oil and at the same time the friction surfaces can be cleaned and lubricated with a lubricant.

Ball Bearings And Turntable Bearings –

After removing the turntable, the bearings can be lubricated. Make sure no balls are missing from the bearings.

Linkage And Levers –

All bearing points on the levers as well as the cams can be lubricated with grease or oil so that the levers slide smoothly and easily over each other and will not tend to clog.

ADJUSTMENTS

Lifting The Pickup Arm –

The pickup arm must lift high enough to easily clear a stack of records 1 1/8" high but its top edge must stand away from 1/8 to 3/16" from the bottom of the lowest record on the offset shoulder. It must drop down perfectly onto the first record on the turntable. From Serial No. 40500, the height of the pickup arm is adjusted by a set screw on the pickup arm stand.

Inward Movement Of Pickup Arm –

When no record is held on the spindle for the pickup to scan and locate, this will continue moving inwards until it is some 3 1/4" from the center of the turntable. Possible adjustment to set-down lever.

Inward Movement After Size Location –

If the pickup arm sets down too near the center of the record, this may be due to a bent tag on the return locator cam (79). Should the pickup arm set-down too near to the record edge, this can be corrected by bending the tag on the return locator cam slightly inwards.

Adjust with care as roughly .004" movement of the tag equals about 1/16" alteration to the set-down point.

Automatic Tripping –

When the trip link (30) is held still and the loop on the turntable pinion (44A) turned backwards, there should be a clearance of between .020 and .023" between the trip link (30) and the loop.

Tripping i.e. the holding back of the trip link by the trip loop must take place when the point of the needle is 2 1/2" from the center of the record. This position can be set by loosening off the holding screw and turning the locator cam arm (62A) as required.

After loosening the locking screw, the adjuster cam is turned so that the tripping clearance is .019".

The bearing friction of the trip lever on the friction strap must be greater than the friction set up between the trip link (30) and the support arm.

An adjustment check can be made by vertically moving the trip link (30) gently to one side. The support arm should remain still.

Needle Pressure –

The needle pressure can be adjusted as required by turning the knurled head of the holding screw in either a clockwise or anti-clockwise direction. After adjusting the pressure to roughly 10 grammes on the fifth record, the holding screw is again tightened up.

TROUBLE CHART

TROUBLE	CAUSE	REMEDY
After starting, the pick-up arm returns and drops on the arm rest.	The outwards movement lever (103) is not far enough out of the slot in the main cam assembly (89).	The starter button (23) must move the outwards movement lever (103) far enough to allow the blocking segment to move over the slot.
After the record is dropped, the pickup arm does not swing inwards.	Switch lever (114) and set-down lever (81) out of adjustment.	Re-adjust switch lever (114) and set-down lever (81). An important point is that the set-down lever drops firmly down on the stop on the locator and that there is a clearance of between 3/64 and 3/32" between switch lever and set-down lever.
Pickup sets down too record edge or too near record center.	Tag on return locator cam (89A) not positioned correctly.	If the pickup sets down too near record edge, this can be corrected by bending tag inwards slightly. Pickup setting down too near record center, bend tag slightly outwards.
Unit changes over too early or record not played to the end.	Tripping clearance too small. Friction lever (62B) not swinging freely in its bearings.	Bend trip lever so clearance is smaller. Remove grease between pasteboard disc and friction lever. (trip link must contact the strongest part of the loop).
Unit does not change.	Driving wire on turntable pinion (44A) bent or missing. Tripping clearance too large. Trip loop bent.	Bend wire straight or replace. Bend trip link to reduce clearance. Bend trip loop to original position.
After changing, the pickup arm drops down onto the record again.	Outwards movement lever (103) forced too far out of the slot in the main cam assembly.	Bend main switch lever somewhat shorter.
After changing, record drops onto pickup arm.	Pickup arm height out of adjustment.	The height at which the pickup arm moves can be adjusted by the cone of the locator plate (67). This height must be set so that when the arm swings outwards, it is 3/64 to 3/32" below the level of the record support disc. Replace spindle. When new, offset clearance is roughly 1/8".
After the record is changed, the pickup arm returns to the arm rest and switches off the unit.	As the record drops the set-down lever (81) springs upwards and over on top of the locator plate (66).	Re-adjust positions of switch lever and setdown lever (81).
Unit starts to change as the pickup arm drops down onto the new record.	Spring (101) in housing too weak.	Fit new spring.
After the last record has been played, the pickup does not return to the arm rest but continues playing last record.	Set-down lever (81) does not move to switched off position.	Re-adjust setting of switch lever (114) and set-down lever (81). In its switched-off or inoperative position, the set-down lever must be over the locator plate (66). Check that both switch lever and set-down lever move easily in their bearings.
Player changes too early-record is not played to the end.		From unit No. B40500 an oiled linen washer has been fitted under the friction lever. This should be removed.
Player does not change at all.	Tripping clearance too large. Wire loop bent.	Bend trip link slightly shorter. Bend wire loop back to its original position.

NOTE: The turntable should only be removed or replaced by turning it in a clockwise direction.

MECHANICAL PARTS LIST

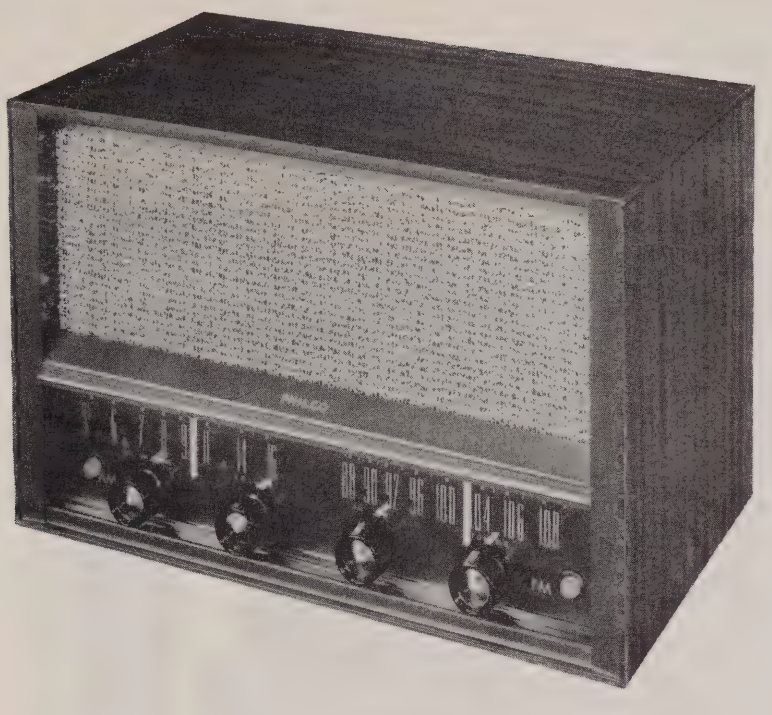
Ref. No.	Part No.	Description
1		Cross Pin
2		Tone Arm
2A		Scanning Tab
3		Holding Screw (3)
4		Release Spring
5		Setting Ring
6		Setting Ring
7		Tone Arm Mounting Bracket
8		Grub Screw MS
9		Holding Screw
10		Pick-up Base Screw
11		Pick-up Base
12		Lock Assembly Screw
13		Lock Assembly Washer
14		Lock Assembly Washer
15		Lock Assembly
16		Screw
17		Screw
18		Manual Spindle Bracket Screw (2)
19		Lift Pin
20		Manual Spindle Bracket
21		Arm Rest Base
22		Set Screw
23		Starter Button
24		Arm Rest
25		Stand Screws
26		Base Plate
27		Mounting Screw For Switch
28		"C" Washer
29		Flat Washer
30		Trip Link
31		Flat Washer
32		Imposing Arm
33		Press On Spring
34		Trip Link Clip
35		Adjustment Eccentric
36		Set Screw
37		Holding Disc Assembly
38		Part of Item 37
39		Spring Clamp
40		"C" Washer
41		Washer
42		Cartridge Mounting Bracket
43		Cartridge
44		Turntable
44A		Gear Pinion
45		Gearwheel
45A		Control Shaft
46		Wire Loop
47		Washer
48		Automatic Spindle
49		Manual Spindle
50		"C" Washer
51		Flat Washer
52		Idler Wheel
53		Flat Washer
54		Idler Wheel Tension Spring
55		Fiber Idler Wheel Slide
56		Speed Shift Knob
57		Locator Plate Adjustment Bracket
58		Locator Tension Spring
59		Screw
60		Lock Nut
61		Locator Plate Adjustment Screw
62		Stand (Includes Items 57 thru 63)
62A		Return Locator Lever
62B		Friction Lever
63		Set Screw
64		Start Lever
65		"C" Washer
66		Rocker Arm and Locator Plate
67		Locator Cam
68		Set Screw
69		Outwards Movement Lever Bracket
70		Pivot Bracket
71		Locator Plate Tension Spring
72		Rocker Arm Mounting Bracket
73		Screw
74		Bracket Mounting Screw (3)
75		Replacing Arm
76		Set Screw (2)
77		Starting Lever Tension Spring
78		"C" Washer
79		Return Locator Lever
80		Return Spring
81		Set-Down Lever
82		Pivot Pin
83		"C" Washer
84		Switch Lever Stop
85		Mounting Spring (4)
86		Compoundable Spring
87		Housing
88		Set Screw
89		Main Cam Assembly
89A		Locator Cam
89B		Ejector Cam
90		Bell-Shaped Cam
91		Short Circuiter
92		Short Circuiter
93		Washer
94		Screw
95		Ejector Slide and Switch Lever Mounting Bracket
96		Return Spring
97		Bell-Shaped Cam Set Screw (2)
98		Setting Nut
99		Setting Screw
100		Setting Screw Mounting Bracket
101		Housing Tension Spring
102		Housing Spacer
103		Outwards Movement Lever
104		Outwards Movement Lever Tension Spring
105		Main Switch Lever
106		"C" Washer
107		Ejector Slide
107A		Ejector Link
108		Washer
109		"C" Washer
110		"C" Washer
111		Washer (2)
112		"C" Washer (2)
113		Screw (2)
114		Switch Lever
115		Washer (3)
116		Tension Spring
117		"C" Washer (3)
118		Fiber Washer
119		Washer
120		Speed Setting Lever
121		Idler Drive Belt (2)
122		Grommet (3)
123		Motor Mounting Bracket
124		Motor (110V, 60 Cycle)

PHOTOFACT* Folder

*TRADE MARK

RETMA MEMBER

PHILCO MODEL E-976

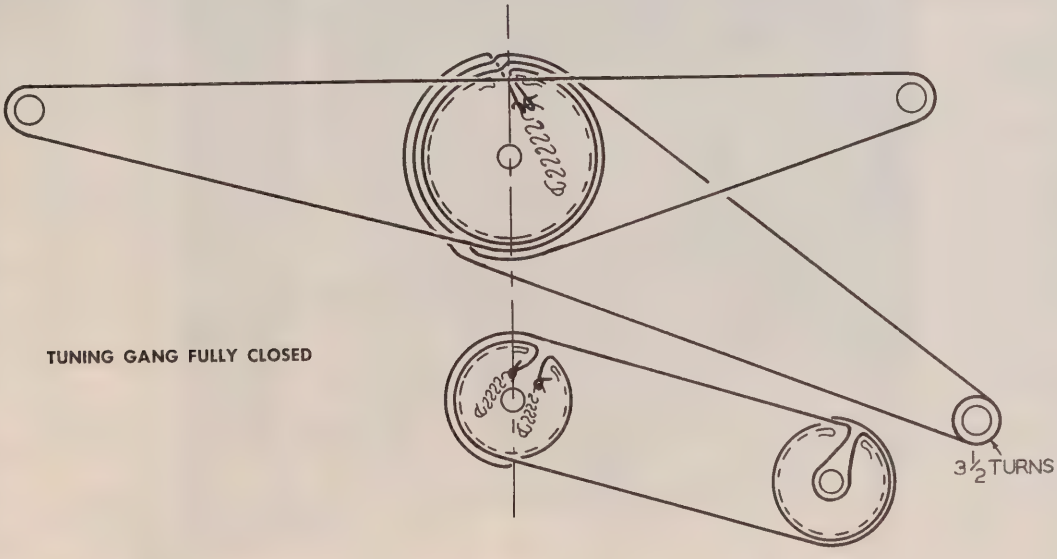


PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

PHILCO
MODEL E-976

TRADE NAME	Philco Model E-976		
MANUFACTURER	Philco Corp. Tioga & "C" Sts., Philadelphia, Pa.		
TYPE SET	AC-DC Operated FM-AM Receiver		
TUBES (Seven)	Types 12AT7 FM RF Amp.-FM Conv., 12BA6 1st FM IF Amplifier, 12BE6 AM Converter, 12BA6 2nd FM IF Amp.-1st AM If Amp., 12AU6 Limiter, 19T8 Disc.-AM Det.-AVC-AF Amp., 35C5 Output		
POWER SUPPLY	105-125 Volts AC-DC	RATING	.33 Amp. @ 117 Volts AC (30 Watts)
TUNING RANGE—BROADCAST	540KC - 1620KC	FREQ. MOD.	88MC-108MC

PHILCO
MODEL E-976



DIAL CORD STRINGING

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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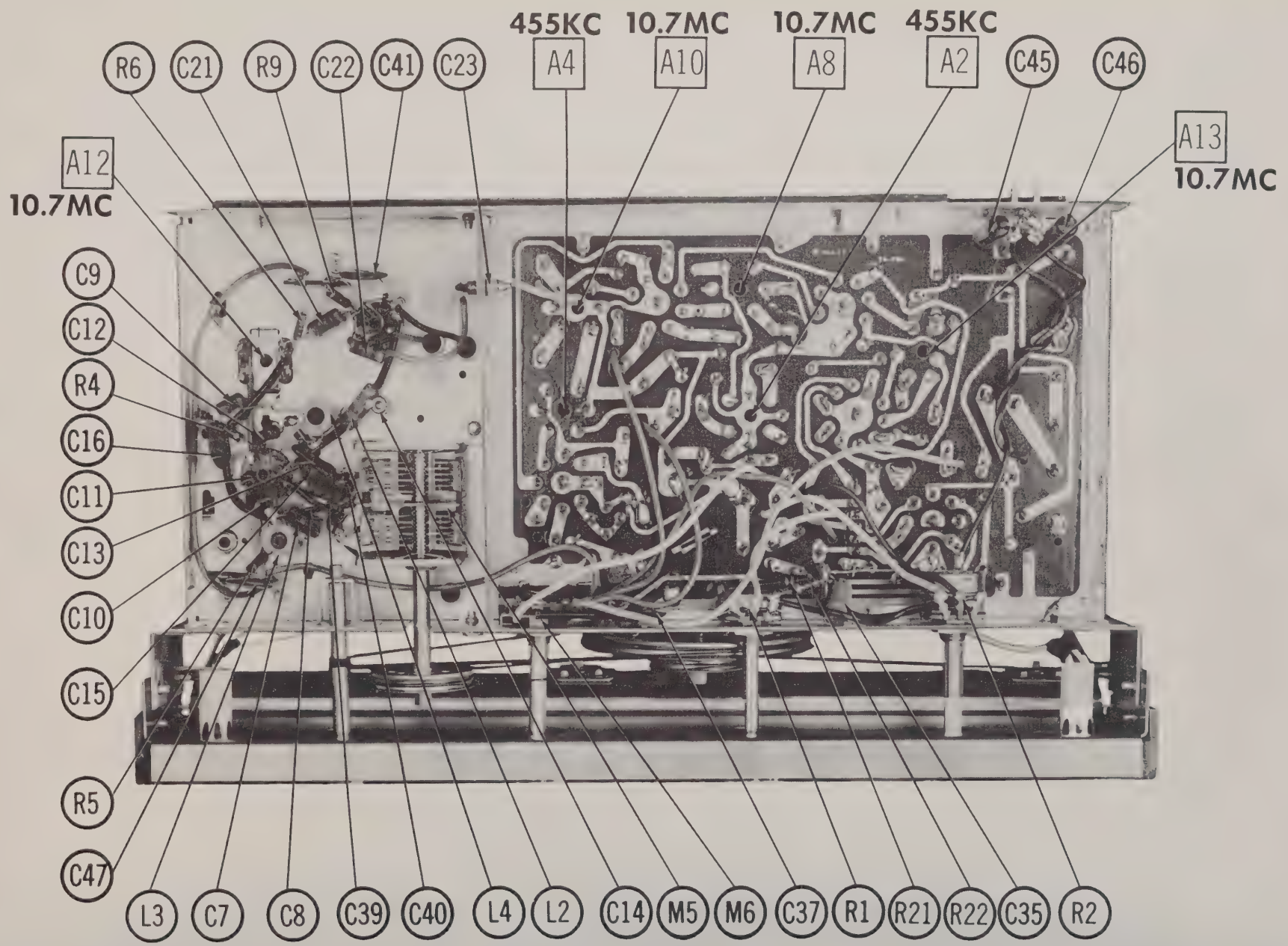
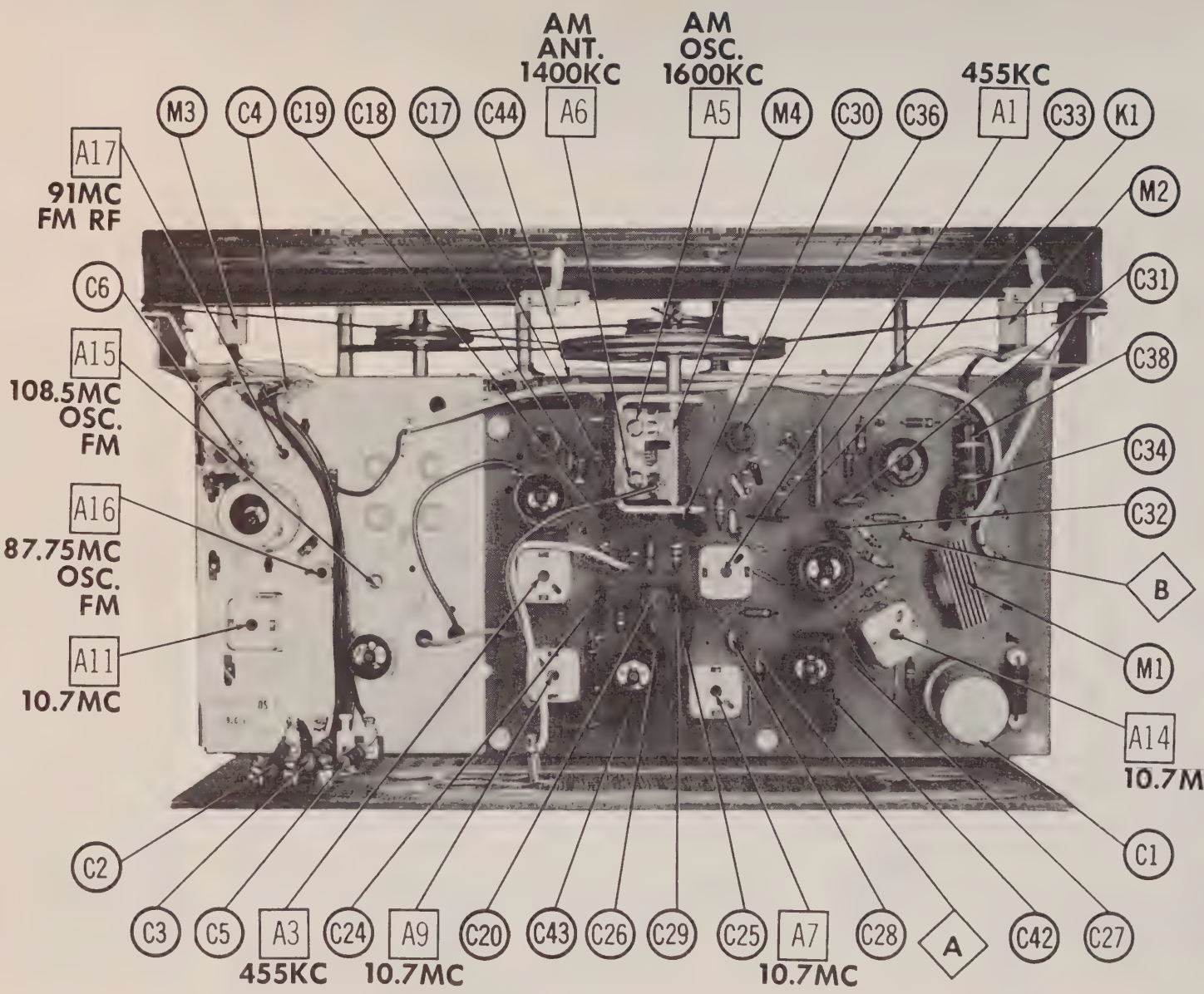


CHASSIS BOTTOM VIEW



CHASSIS TOP VIEW

PHILCO MODEL E-976

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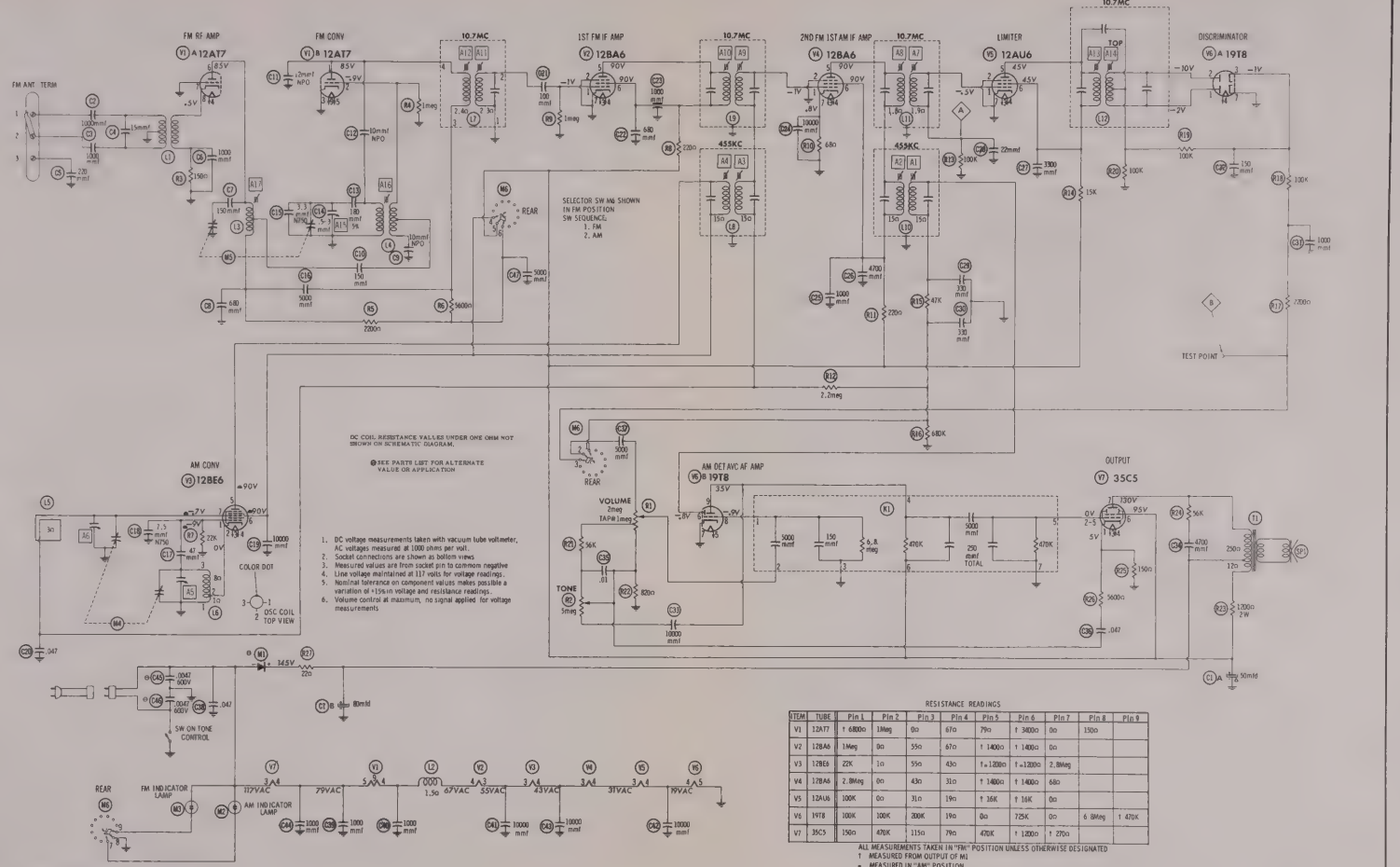

FM RF AMP
FM CONV
10.7MC
1ST FM IF AMP
2ND FM 1ST AM IF AMP
LIMITER
DISCRIMINATOR
FM ANT. TERM.
455KC
SELECTOR SW M6 SHOWN IN FM POSITION SW SEQUENCE. 1. FM 2. AM
REAR
TEST POINT
AM CONV
AM DET AVC AF AMP
OUTPUT
VOLUME
TONE
COLOR DOT
OSC COIL TOP VIEW
SW ON TONE CONTROL
FM INDICATOR LAMP
AM INDICATOR LAMP
117VAC
79VAC
1.5a
67VAC
55VAC
43VAC
31VAC
79VAC
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM.
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
1. DC voltage measurements taken with vacuum tube voltmeter, AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AT7	↑ 6800Ω	1Meg	0Ω	67Ω	79Ω	↑ 3400Ω	0Ω	150Ω	
V2	12BA6	1Meg	0Ω	55Ω	67Ω	↑ 1400Ω	↑ 1400Ω	0Ω		
V3	12BE6	22K	1Ω	55Ω	43Ω	↑ =1200Ω	↑ =12000Ω	2.8Meg		
V4	12BA6	2.8Meg	0Ω	43Ω	31Ω	↑ 1400Ω	↑ 1400Ω	68Ω		
V5	12AU6	100K	0Ω	31Ω	19Ω	↑ 16K	↑ 16K	0Ω		
V6	19T8	100K	100K	200K	19Ω	0Ω	725K	0Ω	6.8Meg	↑ 470K
V7	35C5	150Ω	470K	115Ω	79Ω	470K	↑ 1200Ω	↑ 270Ω		

ALL MEASUREMENTS TAKEN IN "FM" POSITION UNLESS OTHERWISE DESIGNATED
↑ MEASURED FROM OUTPUT OF M1
= MEASURED IN "AM" POSITION

A PHOTOFACT STANDARD NOTATION SCHEMATIC
Howard W. Sams & Co., Inc. 1957

378-11

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and chassis.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
Tone control to Treble (CCW).
With tuning gang fully closed set pointer to calibration mark above "5".

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.05MFD	High side to pin 7 (grid) of 12BE6 (V3). Low side to chassis.	455KC (400∿Mod)	AM	Tuning gang fully closed	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.		Loop	1600KC	"	1600KC	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	1400KC	"	Tune to 1400KC signal	"	A6	"

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Use 100K Resistor in series with high side of VTVM.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4.	.05MFD	High side to junction of L1, R3 & C6. Low side to chassis.	10.7MC (unmod)	FM	Point of non-interference	DC probe to point (A). Common to chassis.	A7, A8, A9, A10, A11, A12	Adjust for maximum deflection.
5.	"	"	"	"	"	DC probe to point (B). Common to chassis.	A13, A14	Detune A14. Adjust A13 for maximum deflection. Adjust A14 for zero reading.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use 100K Resistor in series with high side of scope.
Use frequency modulated signal with 60∿ modulation and 150KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
4.	.05MFD	High side to junction of L1, R3, & C6. Low side to chassis.	10.7MC (150KC Swp)	FM	Point of non-interference	Vert amplifier to point (A). Low side to chassis.	A7, A8, A9, A10, A11, A12	Adjust for curve of maximum amplitude and symmetry similar to Fig. 1.
5.	"	"	"	"	"	Vert amplifier to point (B). Low side to chassis.	A13, A14	Adjust so that 10.7MC occurs at center of crossover lines similar to Fig. 2. SLIGHTLY retouch A13 for maximum amplitude and straightness of crossover lines.

FM RF ALIGNMENT

Use 100K Resistor in series with high side of VTVM.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
6.	270Ω Carbon Resistor	High side thru 270Ω to FM Antenna terminal. Low side to chassis.	108.5MC	FM	See "Remarks"	DC probe to point (A). Common to chassis.	A15	With FM tuning gang fully open, place a .006" mon-metallic shim between rotor and stator plates. Close gang until shim is held in position and adjust A15 for maximum deflection.
7.	"	"	87.75MC	"	Tuning gang fully closed	"	A16	Adjust for maximum deflection.
8.	"	"	91MC	"	91MC	"	A17	Adjust for maximum deflection.

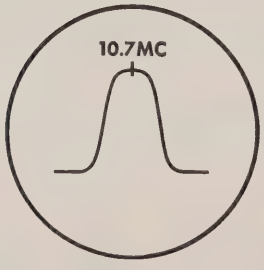


FIG.1

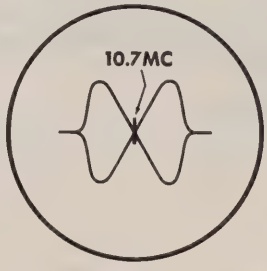


FIG. 2

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	FM RF Amp. - Converter	12AT7	
V2	1st FM IF Amplifier	12BA6	
V3	AM Converter	12BE6	
V4	2nd FM IF Amplifier - 1st AM IF Amplifier	12BA6	
V5	Limiter	12AU6	
V6	Discriminator - AM Det. - AVC - AF Amplifier	19T8	
V7	Output	35C5	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA PHILCO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	▲50	150	30-2585-9	AFH2-19	BBRD8515	TCD498	TMD-17	D-085	TVL-2442.1
B	80	150							

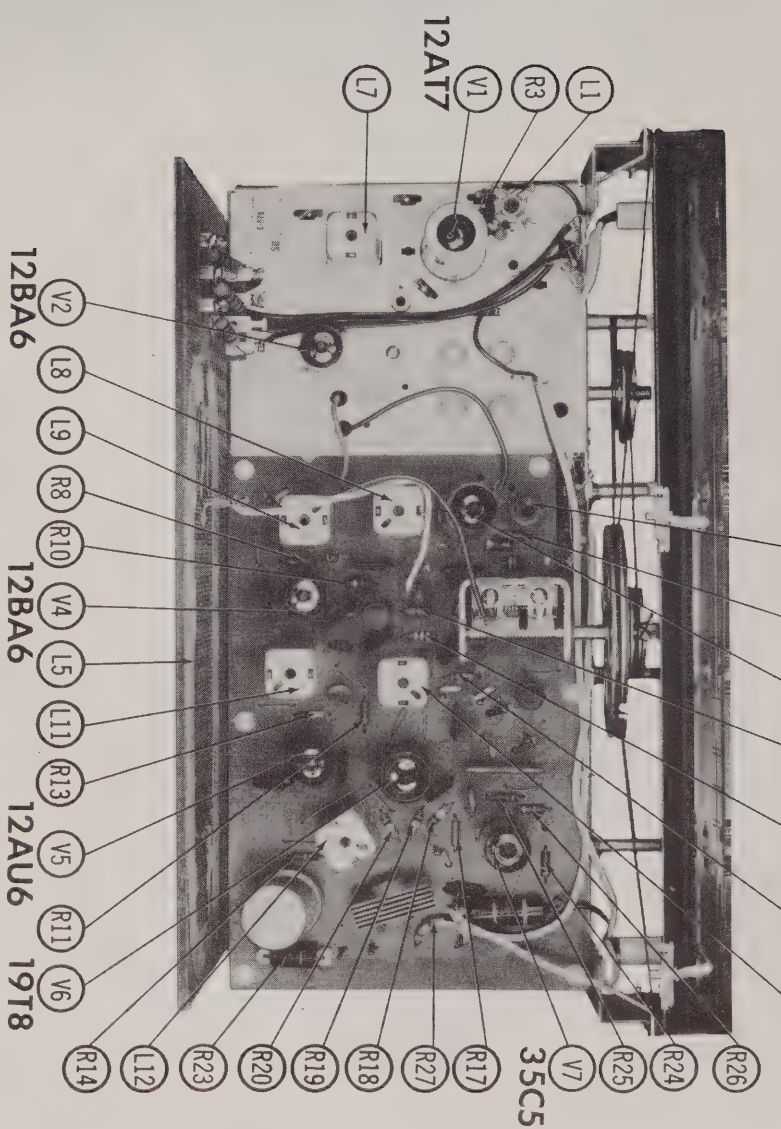
FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA PHILCO PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C2	1000		62-210001011	SI 1000	D6-102	LT6D1	GP-1000	UC-521	5HK-D1	
C3	1000		62-210001011	SI 1000	D6-102	LT6D1	GP-1000	UC-521	5HK-D1	
C4	15		62-015409011	SI 15	D6-150	LT6Q15	GP-15	UC-5415	5GA-Q15	
C5	220		62-122001001	SI 220	D6-221	LT6T22	GP-220	UC-5322	5GA-T22	
C6	1000		62-210001011	SI 1000	D6-102	LT6D1	GP-1000	UC-521	5HK-D1	
C7	150		60-10155417	1468-00015	DD-151	5W5T15	GP-150	UC-5315	1FM-315	
C8	680		30-1238-23	BPD-00068	DD-681	BYA10T68	ED-680	UC-5368	5GA-T68	
C9	10		62-010409001	NP0-SI 10	TCZ-10	CTA6Q1C	TCO-10	ZT-541	5TCC-Q1	NP0
C10	150		60-10155417	1468-00015	DD-151	5W5T15	GP-150	UC-5315	1FM-315	
C11	12		62-012300001		TCZ-12	CTA6Q12C	TCO-12			NP0
C12	10		62-010409001	NP0-SI 10	TCZ-10	CTA6Q1C	TCO-10	ZT-541	5TCC-Q1	NP0
C13	180		30-1257-8	1469-00018	TCZ-180	22R5T18	CY15C181J		MS-318	5%
C14	.5-3		31-6520-18		829-3		3115-E	CT565A		
C15	3.3		30-1224-114		TCN-3R3		TC7-3.3			N750
C16	5000		30-1238-1	BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	
C17	47		30-1230-4	SI 47	D6-470	LT6Q47	GP-47	UC-5447	5GA-Q47	
C18	7.5		30-1224-83							N750
C19	10000		30-1262	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C20	.047	200	30-4685-45	BPD-05	DF-503	BC2S47J		ACE6147	2SE-S47	
C21	100		62-110009001	SI 100	D6-101	LT6T1	GP-100	UC-531	5GA-T1	
C22	680		62-168001011	SI 680	D6-681	LT6T68	GP-680	UC-5368	5GA-T68	
C23	1000		30-1245-6	EF-001	MFT-1000				503C-D1	
C24	10000		30-1262	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C25	1000		30-1262-12	BPD-001	DD-102	BYA6D1	ED-1000	DC521	5HK-D1	
C26	4700		30-1262-3	BPD-0047	DD-472	BYA10D47	ED-0047	UC-5247	5GA-D47	
C27	3300		30-1262-5	BPD-0033	DD-332	BYA10D33	ED-0033	UC-5233	5GA-D33	
C28	22		30-1263-19	BPD-000022	DD-220	L10Q22	ED-22	UC-5422	5GA-Q22	
C29	330		30-1262-21	BPD-00033	DD-331	L10T33	ED-330	UC-5333	5GA-T33	
C30	330		30-1262-21	BPD-00033	DD-331	L10T33	ED-330	UC-5333	5GA-T33	
C31	1000		30-1262-12	BPD-001	DD-102	BYA6D1	ED-1000	DC521	5HK-D1	
C32	150		30-1262-24	BPD-00015	DD-151	L10T15	ED-150	UC-5315	5GA-T15	
C33	10000		30-1262	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C34	4700		30-1262-3	BPD-0047	DD-472	BYA10D47	ED-0047	UC-5247	5GA-D47	
C35	.01	200	30-4650-58	BPD-01	DD-103	CUB4S1	GP-10000	GEM-411	2TM-S1	
C36	.047	200	30-4685-45	BPD-05	DF-503	BC2S47J		ACE6147	2SE-S47	
C37	5000		30-1238-1	BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	
C38	.047	400	30-4650-45	BPD-05	DF-503	CUB4S47		GEM-4147	4TM-S47	
C39	1000		62-210001011	SI 1000	D6-102	LT6D1	GP-1000	DC521	5HK-D1	
C40	1000		62-210001011	SI 1000	D6-102	LT6D1	GP-1000	DC521	5HK-D1	
C41	10000		30-1238-2	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C42	10000		30-1262	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C43	10000		30-1262	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C44	1000		62-210001011	SI 1000	D6-102	LT6D1	GP-1000	DC521	5HK-D1	
C45	.0047	600		BPD-0047	DD-472	CUB6D47	GP-4700	GEM-6247	6TM-D47	①
C46	.0047	600		BPD-0047	DD-472	CUB6D47	GP-4700	GEM-6247	6TM-D47	①
C47	5000		30-1238-1	BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	

① In some versions C45 & C46 are combined in a dual 4000MMF unit (Part #30-1266-1).

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	PHILCO PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	2Meg	½	33-5535-45	ABT-78	A47F3-2Meg	Q18-139X	UT-451	Volume, Tap ② 1Meg
B	Shaft			AK-3	FS-3	Not Req.	Not Req.	
R2A	5Meg	½	33-5588-4	B-87	A47-5Meg-S	Q12-141	U67	Tone
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
C	Switch			KB-1	SWE-12	76-1	US-26	

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	PHILCO PART No.	IRC PART No.	
R3	150Ω		66-1158340	BTS-150	
R4	1Meg		65-5108340	BTS-1Meg	
R5	2200Ω		66-2228340	BTS-2200	
R6	5600Ω		66-2568340	BTS-5600	
R7	22K		66-3228340	BTS-22K	
R8	220Ω		66-1228340	BTS-220	
R9	1Meg		66-5108340	BTS-1Meg	
R10	68Ω		66-0688340	BTS-68	
R11	220Ω		66-1228340	BTS-220	
R12	2.2Meg		66-5228340	BTS-2.2Meg	
R13	100K		66-4108340	BTS-100K	
R14	15K		66-3158340	BTS-15K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	PHILCO PART No.	IRC PART No.	
R15	47K		66-3478340	BTS-47K	
R16	680K		66-4688340	BTS-680K	
R17	2200Ω		66-2228340	BTS-2200	
R18	100K		66-4108340	BTS-100K	
R19	100K		66-4108340	BTS-100K	
R20	100K		66-4108340	BTS-100K	
R21	56K		66-3568340	BTS-56K	
R22	820Ω		66-1828340	BTS-820	
R23	1200Ω	2	66-2125340	BTB-1200	
R24	56K		66-3568340	BTS-56K	
R25	150Ω		66-1158340	BTS-150	
R26	5600Ω		66-2568340	BTS-5600	
R27	22Ω		33-1334-21		

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	PHILCO PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	3300Ω Tap ② 16Ω	3-4Ω	32-8784	Z1105	A-3031	A-3336	24S50A	S-16X	

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	PHILCO PART No.	QUAM PART No.	
SP1	5 1/4"	PM	3-4Ω	36-1669-1	52A1	

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA				NOTES
		PHILCO PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	FM Ant. Trans.	32-4718-1				
L2	Fil. Choke	32-4422-8	19-1002	BC-563	4606	2.2 Microhenries; IRC Part #CLA
L3	FM RF Coil	32-4717-1				
L4	FM Osc. Coil	32-4716-1				
L5	Loop Ant.	76-11304				Includes cabinet back
L6	AM Osc. Coil	32-4693-2				
L7	1st FM IF	32-4715-1	16-3487		1463	
L8	1st AM IF	32-4583-14	16-6780	BC-356	13-PC1	
L9	2nd FM IF	32-4712-1	16-3490		1463-PC	
L10	2nd AM IF	32-4583-15	16-6780		13-PC1	
L11	3rd FM IF	32-4712-2	16-3490		1463-PC	
L12	FM Discr.	32-4714-1	17-3491		1464-PC	

PARTS LIST AND DESCRIPTIONS (Continued)

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	PHILCO PART No.	REPLACEMENT DATA
K1	Audio Coup. Net.	150MMF, 5000MMF, 5000MMF, 250MMF, 470K, 470K, 6.8Meg	30-6027	

SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA				NOTES
	CURRENT (Measured)	PHILCO PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	
M1	.070A	34-8040-4 ①	1004A	RS100	100	① Alternate Part #34-8040-1

MISCELLANEOUS

ITEM No.	PART NAME	PHILCO PART No.	NOTES
M2	Pilot Light	76-11043-1	AM Indicator, Neon, Includes Socket Assembly
M3	Pilot Light	76-11043-1	FM Indicator, Neon, Includes Socket Assembly
M4	Tuning Cap.	31-2783-3	2 Gang AM (Ant. 30-395MMF)
M5	Tuning Cap.	31-2786	2 Gang FM
M6	Switch	42-2065	AM-FM (Rotary Wafer Type)

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	54-4718-40	Four used
Cabinet	11227-1	Blonde
Cabinet	11227-2	Fruitwood
Cabinet	11227	Mahogany
Dial Backplate	28-11575	
Dial	54-6330-1	
Dial Pointer	28-9739-4	Two used

PHOTOFACT* Folder

*TRADE MARK

SILVERTONE MODELS 6062, 6063, 6064, 6067 (Ch. 528.39900)

SILVERTONE MODELS 6062, 6063, 6064, 6067 (Ch. 528.39900)

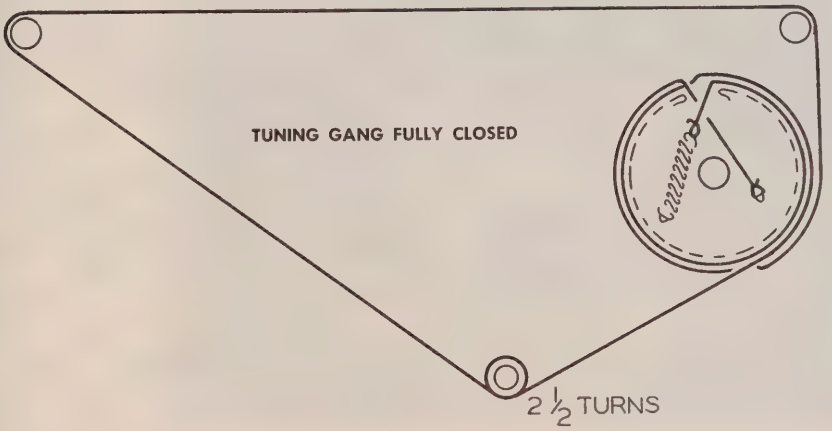
MODEL 6062

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

SILVERTONE MODELS 6062, 6063, 6064, 6067 (Ch. 528.39900)

TRADE NAME	Silvertone Models 6062, 6063, 6064, 6067 (Ch. 528.39900)		
SUPPLIER	Sears, Roebuck & Co., 925 S. Homan Ave., Chicago, Ill.		
TYPE SET	AC Operated FM-AM Receiver With 3 Speed Automatic Record Changer		
TUBES (Eight)	Types 6CB6 RF Amplifier, 6U8 Mixer-Osc., 6BA6 1st IF Amplifier, 6BA6 2nd FM IF Amp. - AM Det. -AVC, 6AL5 Ratio Det., 6AU6 AF Amplifier, 6V6GT Output, 5Y3GT Rectifier		
POWER SUPPLY	110-120 Volts AC-60 Cycles	RATING	.33 Amp. @ 117 Volts AC (33 Watts)
TUNING RANGE—BROADCAST	535KC - 1620KC	FREQ. MOD.	88MC - 108MC

RECORD CHANGER — SILVERTONE CHASSIS 567.37004 OR 567.37005



DIAL CORD STRINGING

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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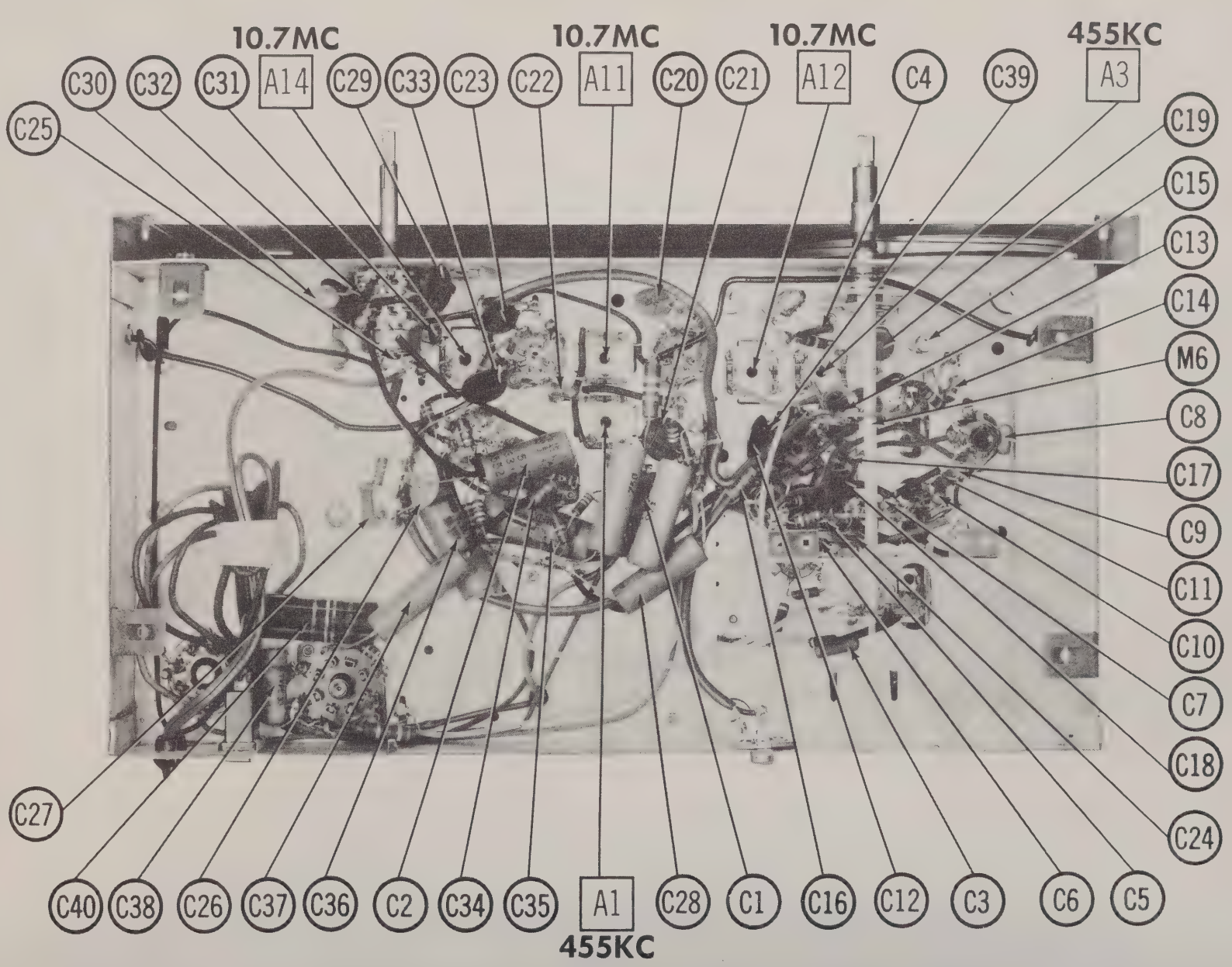
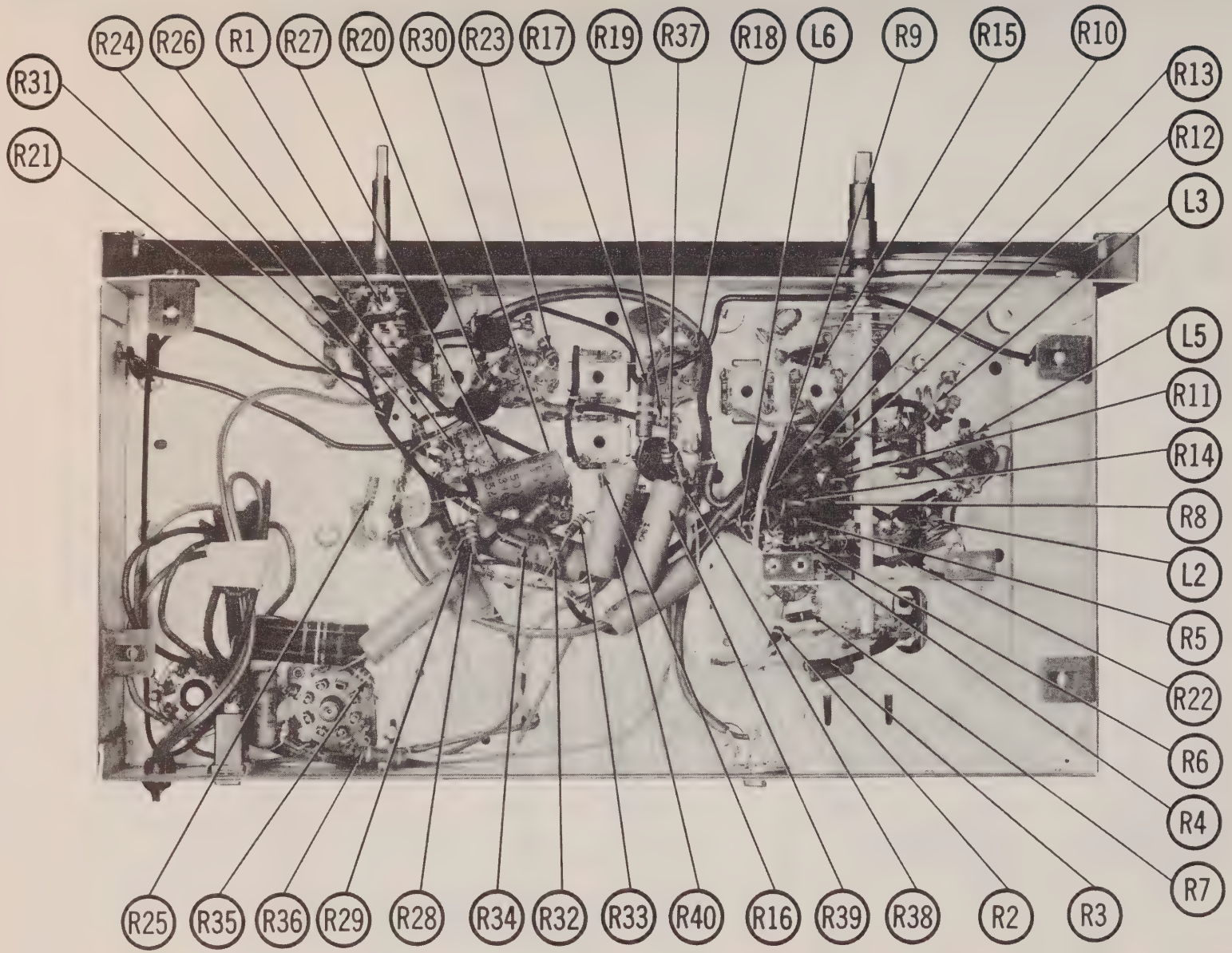


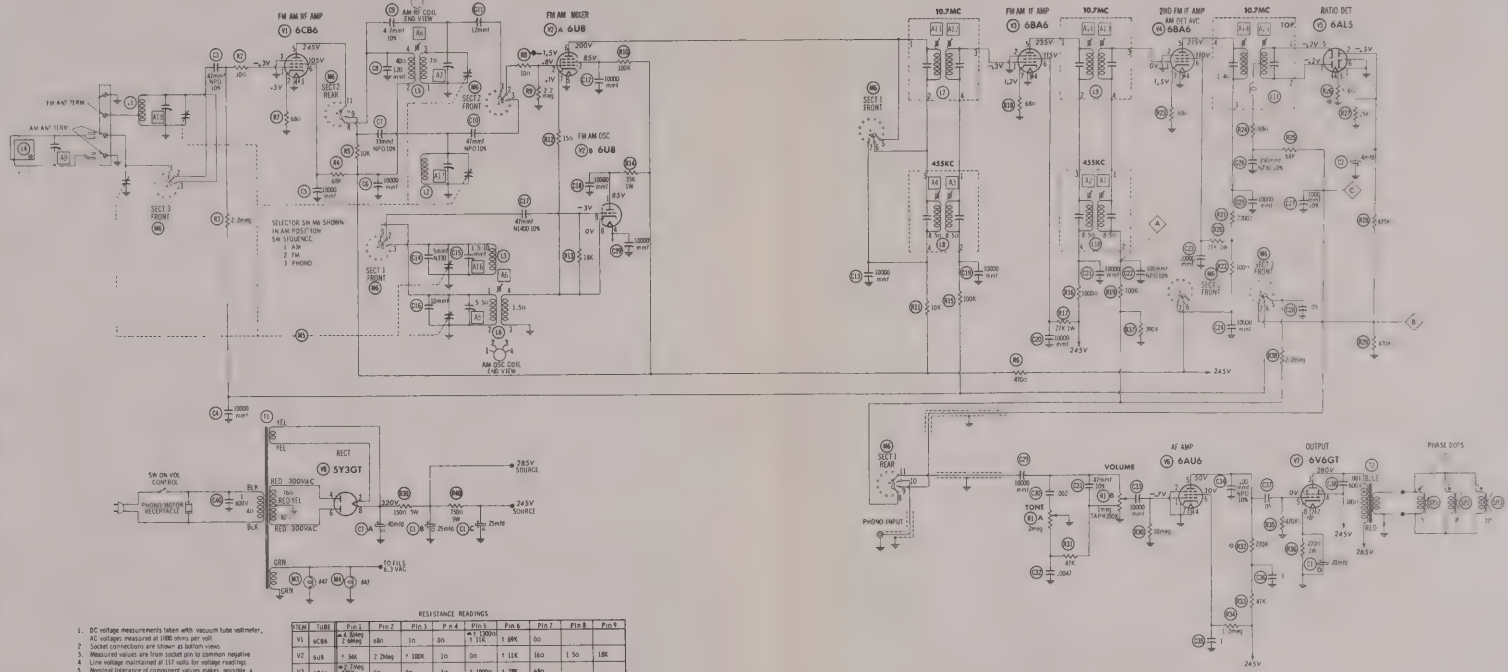
CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

L. F. BLANKENSHIP
3924 MEADE St.
DENVER, COLORADO

SILVERTONE
MODEL 6062



RESISTANCE READINGS

SYM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6CB6	▲ 6.8meg 2.5Meg	68n	1n	0n	↑ 1300n ↑ 11K	↑ 69K	0n		
V2	6U8	↑ 34K	2.2Meg	↑ 100K	1n	0n	↑ 11K	16n	1.5n	18K
V3	6BA6	▲ 2.2meg 30K	0n	0n	1n	↑ 1900n ▲ 1MF	↑ 28K ▲ 18F	68n		
V4	6BA6	49OK	0n	0n	1n	↑ 1300n	↑ 28K	68n		
V5	6AL5	0n	15K	0n	1n	INF	0n	INF		
V6	6AU6	10Meg	0n	0n	1n	↑ 310K	↑ 1.2Meg	0n		
V7	6V6GT	0n	1n	↑ 530n	↑ 900n	470K	NC	0n	270n	
V8	5Y3GT	NC	200K(min)	NC	36n	NC	80n	NC	200K(min)	

ALL MEASUREMENTS TAKEN IN "FM" POSITION UNLESS OTHERWISE DESIGNATED
↑ MEASURED FROM PIN 8 OF V8
▲ MEASURED IN "AM" POSITION
NC NO CONNECTION

1. DC voltage measurements taken with vacuum tube voltmeter, AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

● SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

A PHOTOFACT STANDARD NOTATION SCHEMATIC
Howard W. Sams & Co., Inc. 1957

378-12

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.
Use an insulated alignment screwdriver for adjusting.
To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial.
Tone control to mid-range.

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to AM RF stator lug on tuning gang. Low side to chassis.	455KC (400∿ Mod)	AM	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.	"	"	1620KC	"	"	"	A5	"
3.	"	"	535KC	"	Tuning gang fully closed	"	A6	"
4.	"	High side to AM antenna terminal. Low side to chassis.	1400KC	"	1400KC	"	A7	"
5.	"	"	600KC	"	600KC	"	A8	"
6.		Loop	1400KC	"	1400KC	"	A9	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output. Repeat steps 2 thru 6.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
7.	.005MFD	High side to FM RF stator lug on tuning gang. Low side to chassis.	10.7MC (unmod)	FM	Point of non-interference	DC probe to point Ⓐ. Common to chassis.	A10, A11, A12, A13	Adjust for maximum deflection.
8.	"	"	"	"	"	DC probe to point Ⓑ. Common to chassis.	A14	"
9.	"	"	"	"	"	DC probe to point Ⓑ. Common to point Ⓒ.	A15	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
7.	.005MFD	High side to FM RF stator lug on tuning gang. Low side to chassis.	10.7MC (450KC Swp)	FM	Point of non-interference	Vert amp. thru 100K to point Ⓐ. Low side to chassis.	A10, A11, A12, A13	Disconnect stabilizing capacitor C2. Adjust for curve of maximum amplitude and symmetry similar to Fig. 1.
8.	"	"	"	"	"	Vert amp. thru 100K to point Ⓑ. Low side to chassis.	A14	"
9.	"	"	"	"	"	Vert amp. thru 100k to point Ⓒ. Low side to chassis.	A15	Reconnect stabilizing capacitor C2. Adjust so that 10.7MC occurs at center of crossover lines similar to Fig. 2. SLIGHTLY retouch A14 for maximum amplitude and straightness of crossover lines.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
10.	300Ω Carbon Resistor	Thru dummy to FM antenna terminal. Low side to chassis.	108.5MC	FM	Tunging gang fully open	DC probe to point Ⓐ. Common to chassis.	A16	Adjust for maximum deflection.
11.	"	"	106MC	"	Tune to 106MC signal	"	A17, A18	"
	Check Calibration with signals of 88, 98 & 106MC. If error is less than .3MC and RF circuits are tracking, no further alignment is necessary. If error is more than .3MC proceed with step 12.							
12.	"	Thru dummy to FM antenna terminals. Low side to chassis.	88MC	FM	Tune to 88MC signal	DC probe to point Ⓐ. Common to chassis.	L3	Adjust for maximum deflection by expanding or compressing coil turns.
13.	"	"	108MC	"	Tune to 108MC signal	"	A16	Readjust for maximum deflection.
14.	"	"	106MC	"	Tune to 106MC signal	"	A17, A18	Adjust for maximum deflection. Repeat steps 13 & 14 until desired settings are obtained.
15.	"	"	"	"	"	"		Adjust FM RF rotor plates to receive 106MC signal at correct dial setting. Recheck A17 & A18 for maximum deflection.

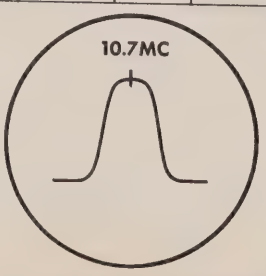


FIG. 1

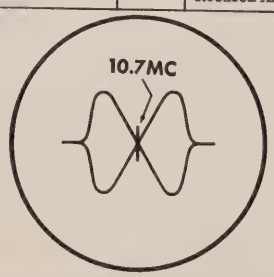


FIG. 2

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	FM-AM RF Amplifier	6CB6	
V2	FM-AM Mixer—		
	FM AM Osc.	6U8	
V3	FM AM IF Amp.	6BA6	
V4	2nd FM IF Amp. —		
	AM Det. - AVC	6BA6	

ITEM No.	USE	TYPE	NOTES
V5	Ratio Det.	6AL5	
V6	AF Amplifier	6AU6	
V7	Output	6V6GT	
V8	Rectifier	5Y3GT	

ELECTROLYTIC CAPACITORS

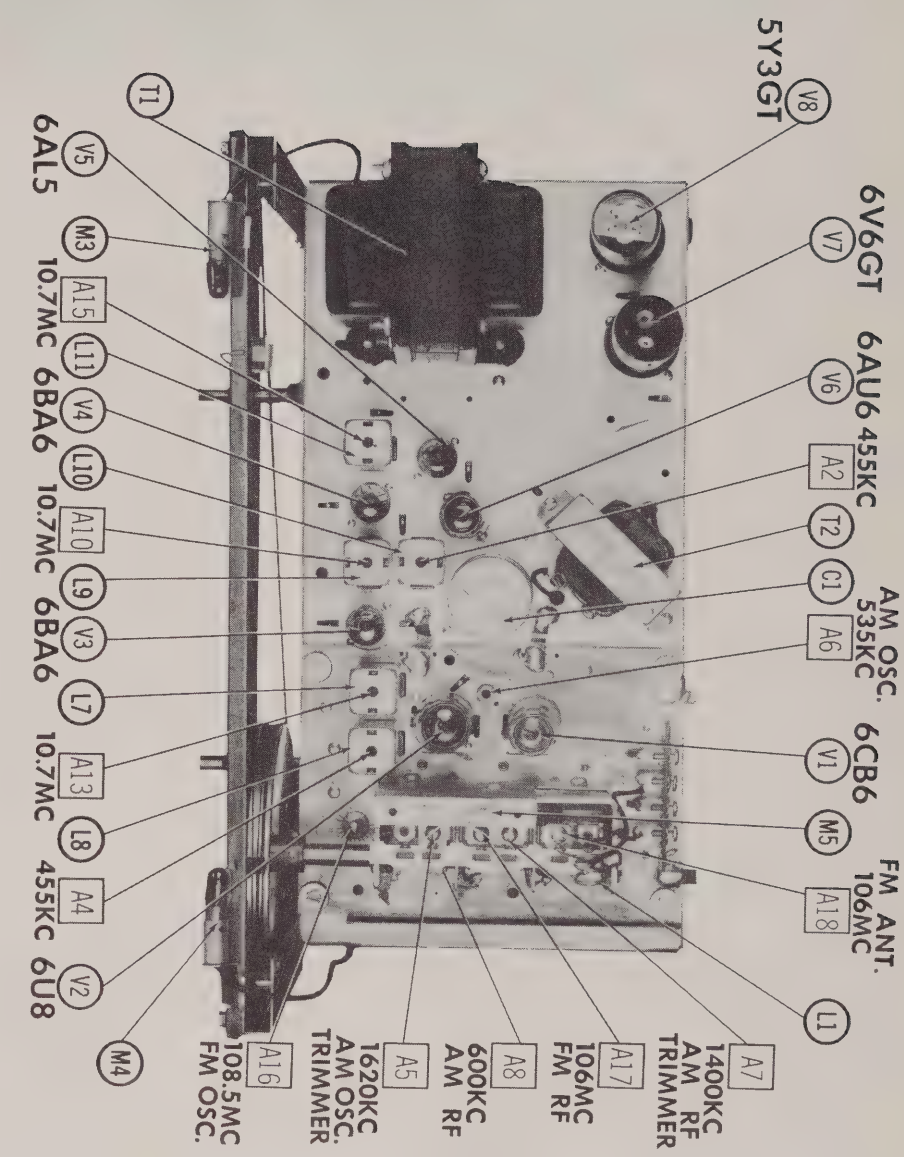
ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	SILVERTONE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	▲40	350	18-342	AFH4-51	D0440	FP430. 2	TMQ-56	Q-210	TVL-4622. 3
B	■25	350							
C	▲25	350							
D	20	25							
C2	4	50	18-339	PRS150V4	BBR4-50	TC30	TD-4-50	MT-0504	TVA-1303

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	SILVERTONE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C3	47		15-333	NP0-SI 47	TCZ-47	C10Q47C	TCO-47	ZT-5447	5TCC-Q47	NP0 10%
C4	10000		15-211	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C5	10000		15-211	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C6	10000		15-211	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C7	33		15-332	NP0-SI 33	TCZ-33	C10Q33C	TCO-33	ZT-5433	5TCC-Q33	NP0 10%
C8	120		15-346	BPD-00012	DD-121	L10T12	ED-120	UC-5312	5GA-T12	
C9	4. 7		15-257	NP0-SI 4. 7	TCZ-4R7	C10V47C	TCO-4. 7	ZT-5547	5TCCB-V47	10%
C10	47		15-333	NP0-SI 47	TCZ-47	C10Q47C	TCO-47	ZT-5447	5TCC-Q47	NP0 10%
C11	12		15-331		TCZ-12	C10Q12C	TCO-12			NP0 10%
C12	10000		15-211	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C13	10000		15-211	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C14	5		15-345							N330
C15	1. 5-10		20-151		829-10					
C16	10		15-347	N750-SI 10	TCN-10	C10Q1U	TC7-10	NT-541	5TCU-Q1	N750 10%
C17	47		15-334							N1400 10%
C18	10000		15-211	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C19	10000		15-211	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C20	10000		15-211	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C21	10000		15-211	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C22	100		15-340	NP0-SI 100	TCZ-100	C10T1C	TCO-100	ZT-531	5TCC-T1	NP0 10%
C23	10000		15-211	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C24	10000		15-211	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C25	10000		15-211	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C26	150		15-343	N750-SI 150	TCN-150	C10T15U	TC7-150	NT-5315	5TCU-T15	N750 10%
C27	1000		15-337				ED-1000			10%
C28	. 05	200	16-152	P288N-05	DF-503	CUB2S5		GEM-415	2TM-S5	
C29	10000		15-211	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C30	. 002	400	16-275	P688N-002	D6-202	CUB6D2	GP-2000	GEM-622	6TM-D2	
C31	47		15-341	NP0-SI 47	DD-470	L10Q47	ED-47	ZT-5447	5TCC-Q47	10%
C32	. 0047	400	16-276	P688N-0047	D6-472	CUB6D47	GP-4700	GEM-6247	6TM-D47	
C33	10000		15-211	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C34	100		15-340	NP0-SI 100	TCZ-100	C10T1C	TCO-100	ZT-531	5TCC-T1	NP0 10%
C35	.1	400	16-187	P488N-1	DF-104	CUB4P1		GEM-401	4TM-P1	
C36	.1	400	16-187	P488N-1	DF-104	CUB4P1		GEM-401	4TM-P1	
C37	. 05	400	16-189	P488N-05	DF-503	CUB4S5		GEM-415	4TM-S5	
C38	. 001	600	16-254	P688N-001	D6-102	CUB6D1	GP-1000	GEM-621	6TM-D1	
C39	10000		15-211	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C40	.1	600	16-611	P688N-1	DF-104	CUB6P1		GEM-601	6TM-P1	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	SILVERTONE PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A B C	2Meg 1Meg Switch	½ ½	24-227			♦		Tone Volume, Tap ⓐ 200K

♦ Concentrikit Equivalent; K-6 Kit, Base Elements and Shafts: B11-139, P17-115 (Panel)
B13-137X, R2-127 (Rear)
76-1 (Switch)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	SILVERTONE PART No.	IRC PART No.	
R2	10Ω		601000K	BTS-10	
R3	2.2Meg		602250M	BTS-2.2Meg	
R4	68K		606830K	BTS-68K	
R5	10K		601030K	BTS-10K	
R6	470Ω		604710K	BTS-470	
R7	68Ω		606800K	BTS-68	
R8	10Ω		601000K	BTS-10	
R9	2.2Meg		602250M	BTS-2.2Meg	
R10	100K		601040K	BTS-100K	
R11	10K		601030K	BTS-10K	
R12	15Ω		601500K	BTS-15	
R13	18K		601830K	BTS-18K	
R14	33K	1	603331K	BTA-33K	
R15	100K		601040M	BTS-100K	
R16	1000Ω		101020M	BTS-1000	
R17	27K	1	602731K	BTA-27K	
R18	68Ω		606800K	BTS-68	
R19	100K		601040M	BTS-100K	
R20	27K	1	602731K	BTA-27K	
R21	2200Ω		602220M	BTS-2200	
R22	100Ω		601010M	BTS-100	
R23	68Ω		606800K	BTS-68	
R24	68Ω		606800K	BTS-68	
R25	68K		606830K	BTS-68K	
R26	5.6Ω			BTS-5.6	Note 1
R27	15K		601530K	BTS-15K	
R28	470K		604740K	BTS-470K	
R29	470K		604740K	BTS-470K	
R30	10Meg		601060M	BTS-10Meg	
R31	47K		604730M	BTS-47K	
R32	270K		602740M	BTS-270K	Note 2
R33	47K		604730M	BTS-47K	
R34	1.2Meg		601250M	BTS-1.2Meg	
R35	470K		604740M	BTS-470K	
R36	270Ω	1	602711K	BTA-270	
R37	390K		603940M	BTS-390K	
R38	2.2Meg		602250M	BTS-2.2Meg	
R39	150Ω	5	61-16		
R40	750Ω	5	61-15		

Note 1. Some versions may use 3.3Ω in this application (Part #60-884)
Note 2. Some versions may use 470K in this application (Part #604740M)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	SILVERTONE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC ⓐ .33A	600VCT ⓐ .096A	5VAC ⓐ 2A	6.3VAC ⓐ 2.7A	80-341	P9312 ①		PC8422 ①	22R05 ① ②	R-12A ①

① Tape center tap on 6.3V winding. ② Use universal mounting brackets.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	SILVERTONE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	5000Ω	2.2Ω	80-311	Z1101	A-2902 ①	A-3825	24S63	S-55X	① Drill new mounting hole.

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	SILVERTONE PART No.	QUAM PART No.	
SP1	5"	PM	3-4Ω	012247 ①	5A1	① Parallel and Phase
SP2	8"	PM	3-4Ω	012264 ①	8A31	
SP3	10"	PM	3-4Ω	012265 ①	10A4A	

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA				NOTES
		SILVERTONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	FM Ant. Coil	10-651				
L2	FM RF Coil	10-713				
L3	FM Osc. Coil	10-712				
L4	Loop Ant.	Y012268				Models 6062, 6063
	Loop Ant.	Y012266				Models 6064, 6067
L5	AM RF Coil	10-647	14-1076 *			* Use full secondary
L6	AM Osc. Coil	10-648	14-1077	BC-393	71-OSC	
L7	1st FM IF	10-519	16-3487	FM-254	1463	
L8	1st AM IF	10-529	16-6758	BC-352	12-C1	
L9	2nd FM IF	10-519	16-3487	FM-254	1463	
L10	2nd AM IF	10-529	16-6758	BC-353	12-C2	
L11	Ratio Det.	10-534	17-3498	FM-255	1465	

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA					REMARKS
	SILVERTONE PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		
		CARTRIDGE	NEEDLE	CARTRIDGE	MOUNT	
M1	Y720087	55T	GD	56	PT-2	

ASTATIC NEEDLE LISTING SHOWN ABOVE IS SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGE LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENTS SEE BELOW.

PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA			REMARKS
	SILVERTONE PART No.	JENSEN PART No.	WALCO PART No.	
M2		* S-67 or † S-66 or †♦ S-66SD or ♦ S-66D	† W-75TPS or †♦ W-75DS or ♦ W-75TPD	* Metal † Jewel ♦ Diamond

MISCELLANEOUS

ITEM No.	PART NAME	SILVERTONE PART No.	NOTES
M3	Pilot Light	89-7	#47
M4	Pilot Light	89-7	#47
M5	Tuning Cap.	19-246	6 Gang (AM Sections: Ant. 17-575MMF, RF 32-375MMF, Osc. 14-156MMF)
M6	Switch	69-205	Band (Rotary Wafer Type)
	Dial Background	31-310	
	Dial Pointer	58-113	

CABINETS & CABINET PARTS

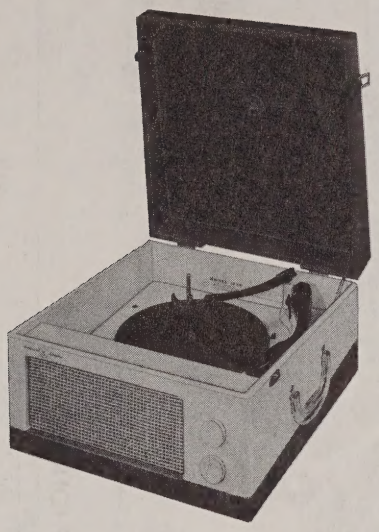
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	310341	Tuning, Models 6062 & 6063
Knob	310346	Tuning, Models 6064 & 6067
Knob	310339	Band Switch, Models 6062 & 6063
Knob	310343	Band Switch, Models 6064 & 6067
Knob	310342	Tone, Models 6062 & 6063
Knob	310345	Tone, Models 6064 & 6067
Knob	310340	On-Off-Volume, Models 6062 & 6063
Knob	310344	On-Off-Volume, Models 6064 & 6067
Cabinet	440271	Limed Oak, Model 6062
Cabinet	440204	Mahogany, Model 6063
Cabinet	440202	Limed Oak, Without Legs, Model 6064
Cabinet	440203	Limed Oak, With Brass Legs, Model 6067
Escutcheon	100865	Control Panel, Models 6062 & 6063
Escutcheon	100863	Control Panel, Model 6064
Escutcheon	100864	Control Panel, Model 6067
Dial Scale	490135	Models 6062 & 6063
Dial Scale	490133	Model 6064
Dial Scale	490134	Model 6067

RETMA MEMBER

V-M MODEL 1260

V-M MODEL 1260

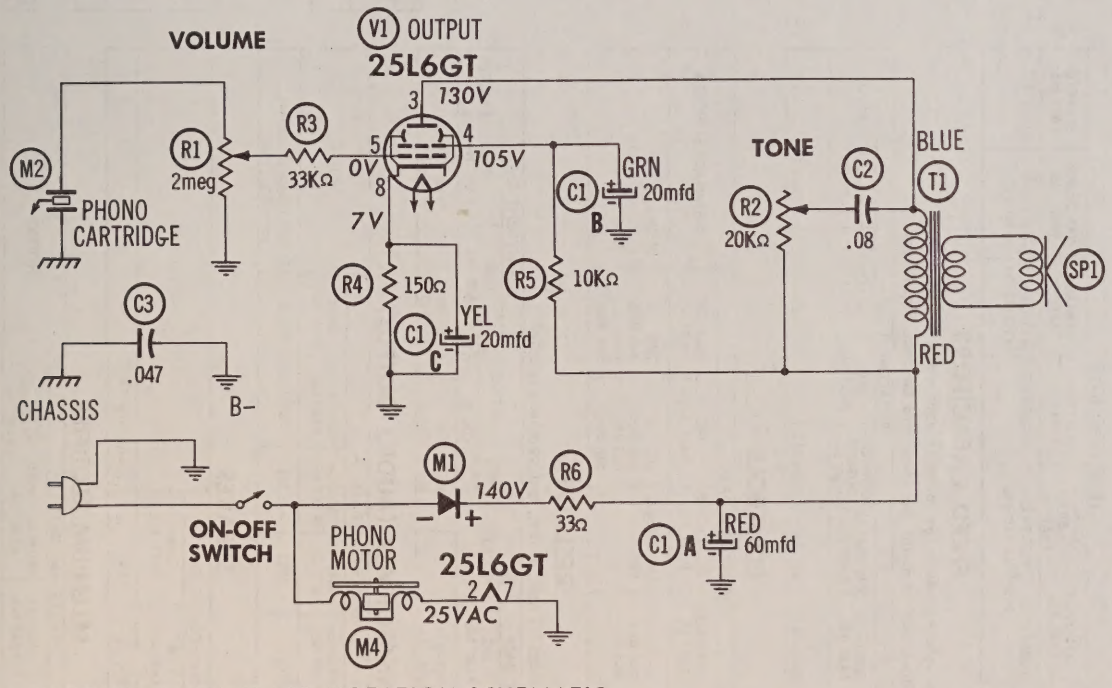


PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

V-M MODEL 1260

TRADE NAME	V-M Model 1260
MANUFACTURER	V-M Corp., Benton Harbor, Michigan
TYPE SET	AC Operated Phono Amplifier With 4 Speed Automatic Record Changer
TUBES (One)	Type 25L6GT Output
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING .4 Amp. @ 117 Volts AC (42 Watts With Motor)

FOR SERVICE INFORMATION ON RECORD CHANGER — SEE V-M MODEL 1200A — PHOTOFACT SET 353 FOLDER 16



A PHOTOFACT STANDARD NOTATION SCHEMATIC
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PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Output	25L6GT	

ITEM No.	USE	TYPE	NOTES

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA V-M PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	60	150	12007	PRS150V50	BBRT42215	WQ230	TDLT-2	FMT-310	R1422 *
B	20	150		3020	BBR20-150		TD-25-50	FM-1520	
C	20	50							

* Non Catalog Item.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA V-M PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C2	.08	400	12005							
C3	.047	600	12073	BPD-05	DF-503	CUB6S47		GEM-6147	6TM-S47	

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA V-M PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	2Meg	½	12313	B-76	A47-2Meg-Z	Q13-139	U55	Volume
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
R2A	20K	½	11986	B-29		Q13-120	U24	Tone
B	Shaft					Not Req.	Not Req.	

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA V-M PART No.	IRC PART No.	NOTES
R3	33K		11093	BTS-33K	
R4	150Ω		10533	BTS-150	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA V-M PART No.	IRC PART No.	NOTES
R5	10K		10973	BTS-10K	
R6	33Ω		10373	BTS-33	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA V-M PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	1900Ω	3-4Ω	Part of Spkr. 9771-1	Z1101	A-3025	A-3332	26S58 ①	S-12X	① Use original channel mounting frame.

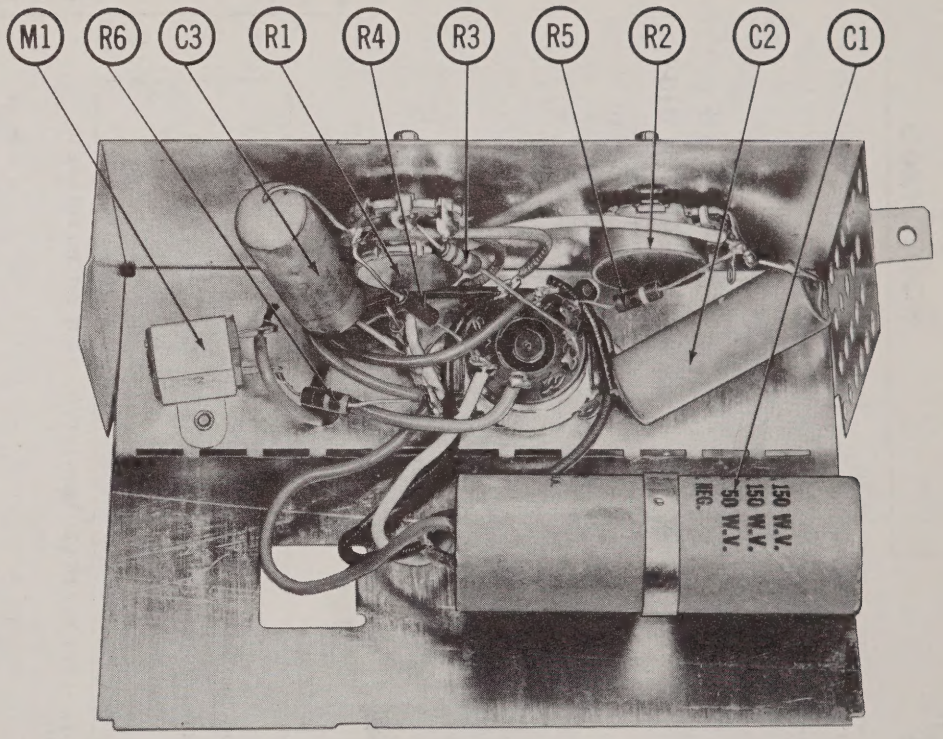
SPEAKER

ITEM No.	TYPE SIZE	TYPE FIELD	TYPE V. C. IMP.	REPLACEMENT DATA V-M PART No.	QUAM PART No.	NOTES
SP1	5 1/4"	PM	3-4Ω	9771-1 ①	52A1	① Includes T1.

SELENIUM RECTIFIER

ITEM No.	RATING CURRENT (Measured)	REPLACEMENT DATA V-M PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	NOTES
M1	.046A	12526	1386	RS065Q ①	65 ①	① Drill chassis hole for stud mounting.

CHASSIS—BOTTOM VIEW



PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA V-M PART No.	ASTATIC PART No. CARTRIDGE	ASTATIC PART No. NEEDLE	ELECTRO-VOICE PART No. CARTRIDGE	ELECTRO-VOICE PART No. MOUNT	REMARKS
M2	7825	420TS	N8-1 & N8-3			

ASTATIC NEEDLE LISTING SHOWN ABOVE IS SPECIFIED FOR THE RESPECTIVE REPLACEMENT CARTRIDGE LISTED. FOR ORIGINAL CARTRIDGE NEEDLE REPLACEMENTS SEE BELOW.

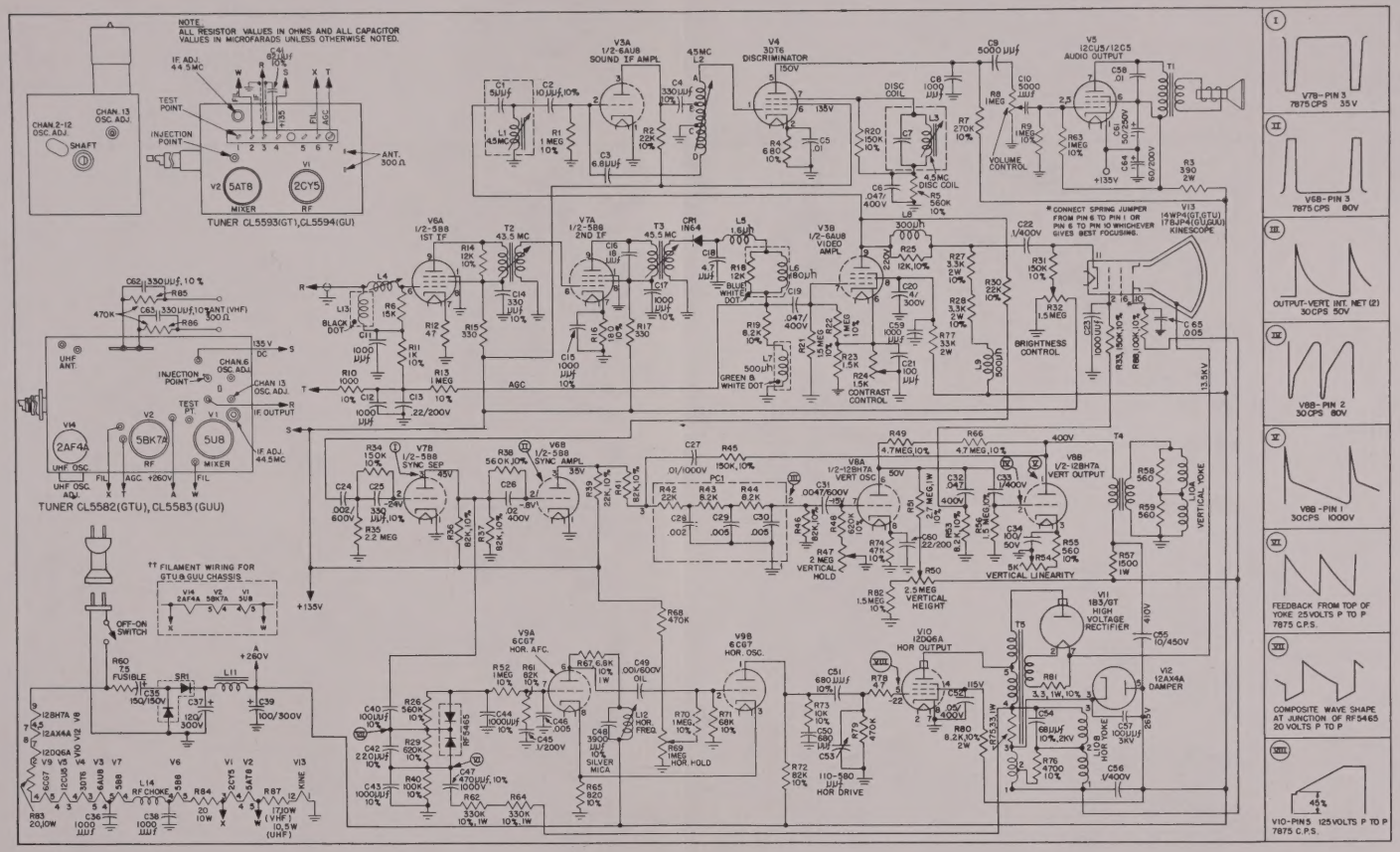
PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA V-M PART No.	JENSEN PART No.	WALCO PART No.	REMARKS
M3		† CRA-55 or ♦ CRA-55D and † CRA-55LP or ♦ CRA-55LPD	† W-64S and † W-64MGS	† Jewel ♦ Diamond

MISCELLANEOUS

ITEM No.	PART NAME	V-M PART No.	NOTES
M4	Motor	14512	


NOTE
ALL RESISTOR VALUES IN OHMS AND ALL CAPACITOR VALUES IN MICROFARADS UNLESS OTHERWISE NOTED.
TUNER CL5593(GT),CL5594(GU)
TUNER CL5582(GTU), CL5583 (GUU)
V3A 1/2-6AU8 SOUND IF AMPL
V4 30T6 DISCRIMINATOR
V5 12CU5/12C5 AUDIO OUTPUT
V6A 1/2-5B8 1ST IF
V7A 1/2-5B8 2ND IF
V8A 1/2-6AU8 VIDEO AMPL.
V7B 1/2-5B8 SYNC SEP
V6B 1/2-5B8 SYNC AMPL.
V8B 1/2-12BH7A VERT OUTPUT
V8A 1/2-12BH7A VERT OSC
V9A 6CG7 HOR. AFC.
V9B 6CG7 HOR. OSC.
V10 12QG6A HOR OUTPUT
V11 183/GT HIGH VOLTAGE RECTIFIER
V12 12AX4A DAMPER
14WP4(GT,GTU) 17BJP4(GU,GUU) KINESCOPE
* CONNECT SPRING JUMPER FROM PIN 6 TO PIN 1 OR PIN 6 TO PIN 10 WHICHEVER GIVES BEST FOCUSING.
†† FILAMENT WIRING FOR GTU & GUU CHASSIS
VOLUME CONTROL
BRIGHTNESS CONTROL
CONTRAST CONTROL
VERTICAL HOLD
VERTICAL LINEARITY
VERTICAL HEIGHT
VERTICAL TOKE
HOR. HOLD
HOR. FREQ.
HOR DRIVE
OFF-ON SWITCH
I V78-PIN 3 7875CPS 35V
II V58-PIN 3 7875CPS 80V
III OUTPUT-VERT. INT. NET (2) 30CPS 50V
IV V88-PIN 2 30CPS 80V
V V88-PIN 1 30CPS 1000V
VI FEEDBACK FROM TOP OF YOKE 25VOLTS P TO P 7875 C.P.S.
VII COMPOSITE WAVE SHAPE AT JUNCTION OF RF5465 20 VOLTS P TO P
VIII V10-PIN 5 125VOLTS P TO P 7875 C.P.S.

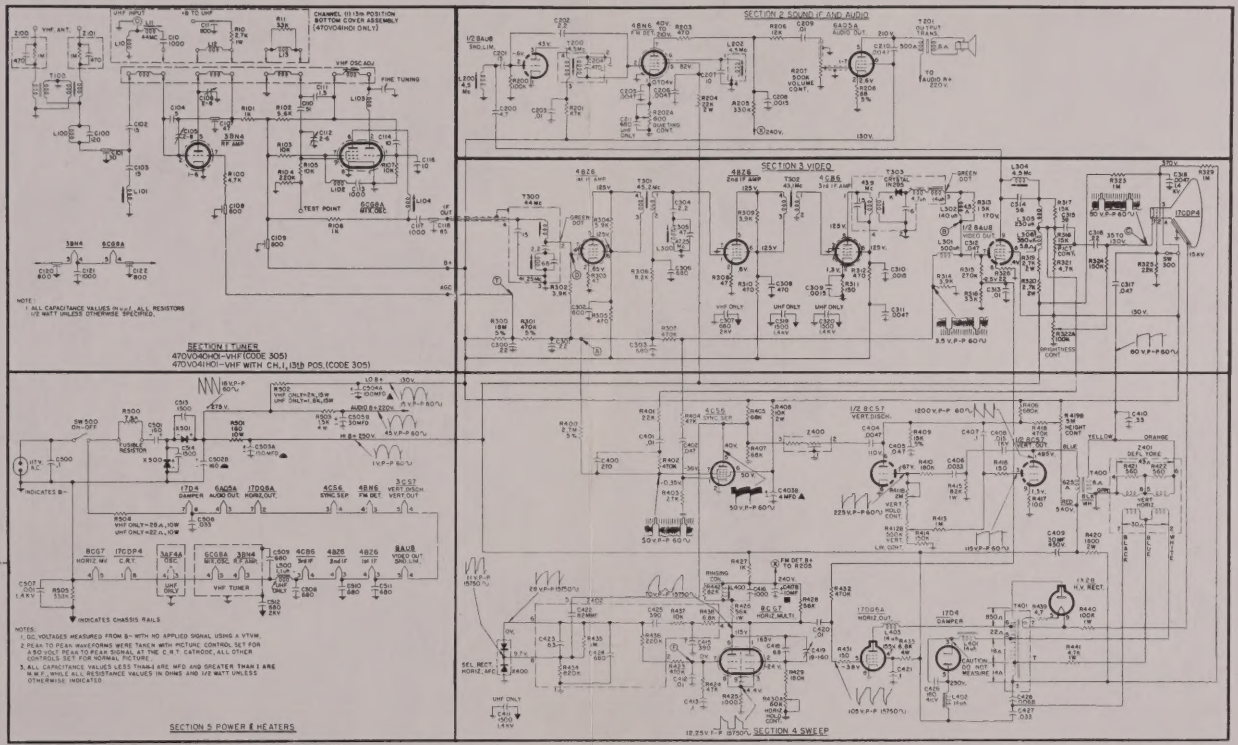
OLYMPIC

MODELS
14TT91
14TT92
17TU93
17TU94

CHASSIS
GT, GTU
GT, GTU
GU, GUU
GU, GUU

SCHEMATIC COURTESY OF OLYMPIC RADIO & TELEVISION INC.

WESTINGHOUSE			
MODELS	CHASSIS	MODELS	CHASSIS
H17T241	V-2373	H17TU241	V-2383
H17T242	"	H17TU242	"
H17T243	"	H17TU243	"
H17T244	"	H17TU244	"
H17T245	"	H17TU245	"


SECTION 1 TUNER
SECTION 2 SOUND IF AND AUDIO
SECTION 3 VIDEO
SECTION 4 SWEEP
SECTION 5 POWER & HEATERS
470V04HO3—VHF(CODE 305)
470V04HO1—VHF WITH CH. 1, 13th POS.(CODE 305)
NOTES:
1. DC VOLTAGES MEASURED FROM B+ WITH NO APPLIED SIGNAL USING A VTVM.
2. PEAK TO PEAK WAVEFORMS WERE TAKEN WITH PICTURE CONTROL SET FOR A 50 VOLT PEAK TO PEAK SIGNAL AT THE C.R.T. CATHODE, ALL OTHER CONTROLS SET FOR NORMAL PICTURE.
3. ALL CAPACITANCE VALUES LESS THAN 1 ARE MFD AND GREATER THAN 1 ARE M.M.F. WHILE ALL RESISTANCE VALUES IN OHMS AND 1/2 WATT UNLESS OTHERWISE INDICATED.

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F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

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